

# The Mining Journal

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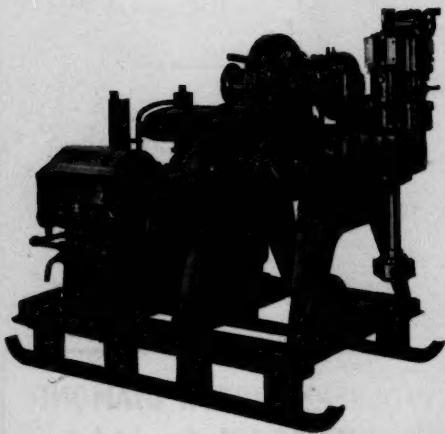
Railway & Commercial Gazette

Vol. CCXXXVIII No. 6079

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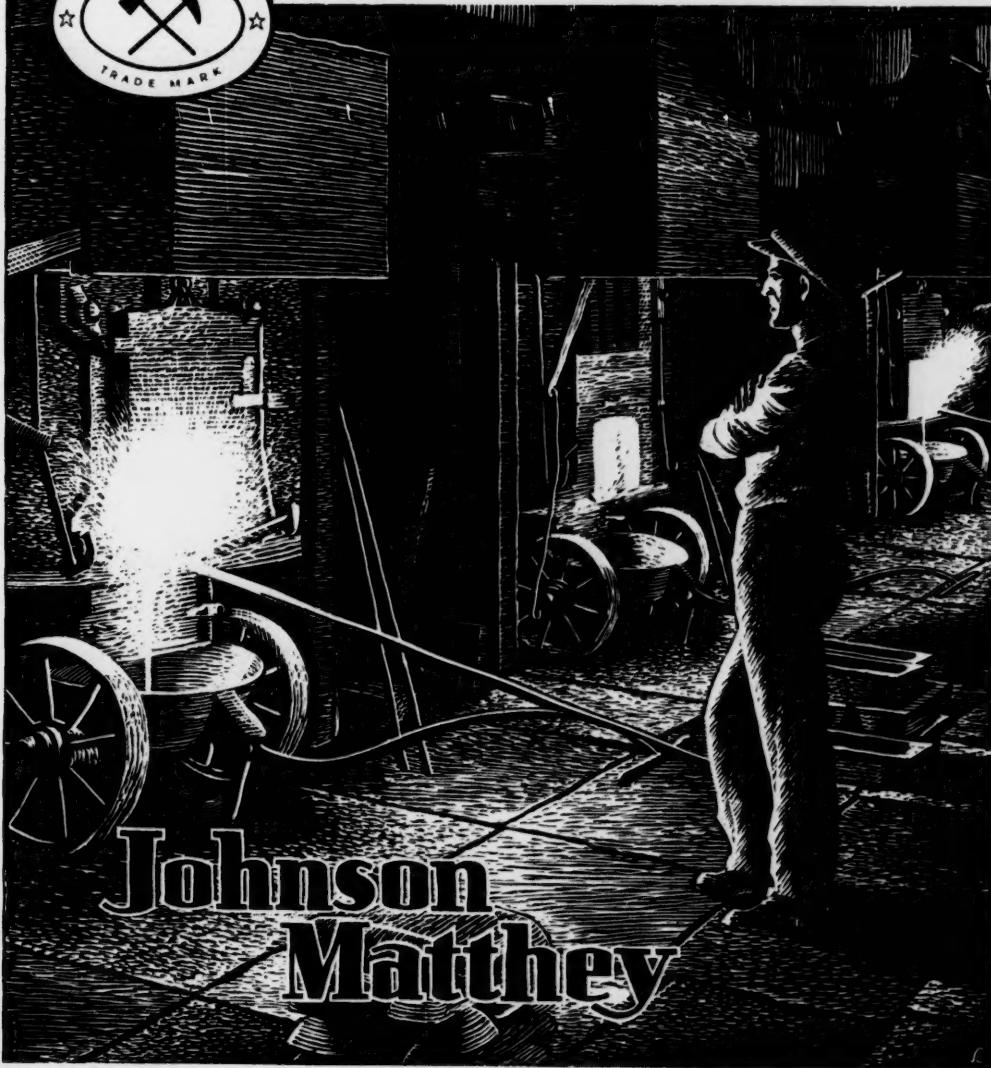
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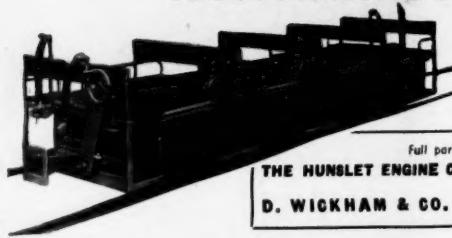
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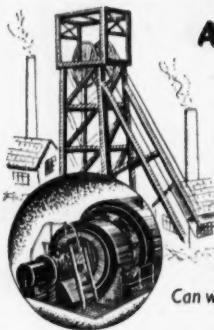


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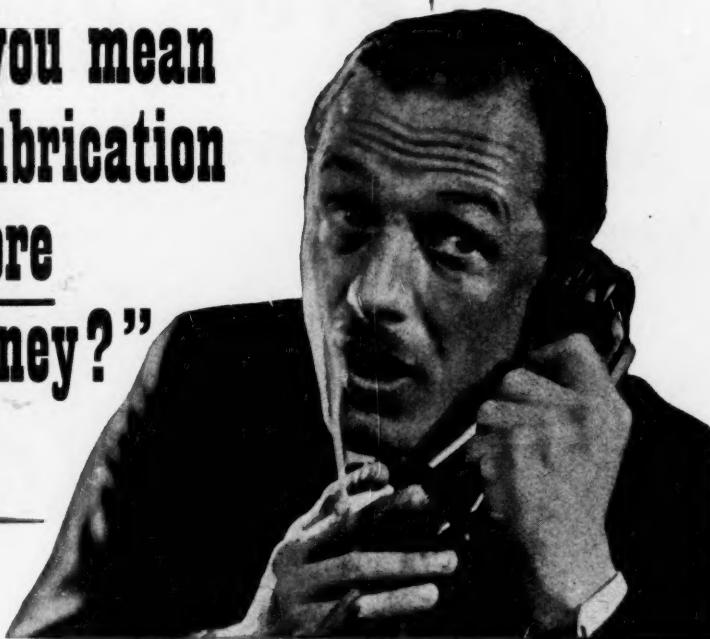


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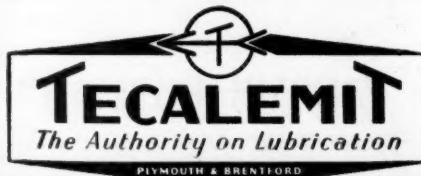
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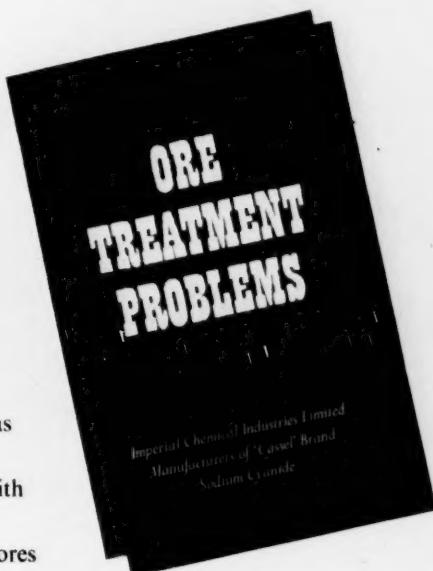
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## NOTES AND COMMENTS

### Yugoslavia Expanding Metal Production

The rehabilitation of its metalliferous mining industry has been one of Yugoslavia's top priority post-war objectives. For upon its success or failure the country's overall industrialization programme largely depends.

A great deal of the necessary spade work was achieved in the years immediately following the war but construction projects never got very far from the blue print stage owing to the lack of machinery, equipment and raw materials. These essential items were at one point promised from the U.S.S.R., but once Yugoslavia broke off with the Cominform it was thrown back on her own resources which, after the devastation and spoilation of the war years, were unequal to the task.

Yet in the last two years through a combination of diplomacy, determination and drive the necessary money, materials and machinery for the rapid expansion of her metalliferous mining industry have not only been promised but have in fact swelled from a mere trickle to something akin to a steady stream. Indeed, from all reports it would appear that a big step towards achieving her objective will be taken during 1952.

In Eastern Serbia more than 1,000 million dinars will be invested in the Bor copper mines which will provide for an increase in the capacity of the new electrolysis plant and will bring the production of refined copper up to 24,000 tons for the year, compared with 14,000 tons in 1951; the construction of an 8 kilometre cable railway between Bor and Vuchje; the rationalization of work in the foundry with the consequent saving of 40 per cent in coke consumption; and finally, the exploitation of new ore bodies. Great importance is being attached to the newly found Majdanpek copper deposits—also in eastern Serbia—which is reputed to be as large as the Bor field and work is now in hand to prepare it for actual opencast operations.

The magnesite mine at Goles, near Pristina, are to be equipped during the year with industrial plant to permit the production of approximately 50,000 tons of caustically-roasted magnesite, and the opening up of two new magnesite works will raise total production still higher. A Reuter report, which states that the "magnochrome" factory now being built at Rankovicevo (formerly Kraljevo) will be able to produce 100,000 tons of fire brick annually, also says that iron ore production at the Ljubija and Vares iron

mines in Bosnia will be as much as 1,500,000 tons in the current year.

The Government's policy of encouraging the export of semi-finished and finished products rather than the copper ores and crude copper is also making good headway. With this in view, the rolling mill at Titovo Uzice is being expanded to an annual capacity of 24,000 tons of semi-finished copper products which will cover the whole of the country's requirements and enable a small portion to be exported.

### Mining in Newfoundland During 1951

When the report covering mining operations in Newfoundland during 1951 comes to be written it is most likely to be as interesting as it will be impressive.

Perhaps the most arresting announcement will be that a continuous belt conveyor system, 12,000 ft. in length, will have been installed, or nearly so, at the Bell Island mine of Dominion Wabana Ore, Ltd. Nine separate belts each powered by a 300 h.p. motor will be used in the new arrangement which replaces the former balanced haulage system with its 20 ton ore cars. The new conveyor arrangements are expected to play an important part in assisting the company to reach its output target for 1952 of 8,000 tons daily from its extensive iron ore bed situated only 15 miles from St. John's, the capital of Newfoundland. The 1951 production target was set at 1,750,000 tons and by the end of October last *The Northern Miner* reports that 1,350,000 tons had been shipped, of which over 600,000 tons were exported to the U.K., 125,000 tons to Western Germany, 575,000 tons to Sydney, Nova Scotia, and 20,000 tons to the U.S.A.

Elsewhere in Canada's new province, mining activity for the first ten months of last year was maintained at a high level. Production at Buchans was pretty much at the same level as in 1950 and from some 270,000 tons hoisted, 10,600 tons of copper concentrates, 23,500 tons of lead concentrates and 48,300 tons of zinc concentrates were produced. Fluorspar production at St. Lawrence during the first ten months of 1951 showed a substantial increase over the corresponding period in 1950 and of the 70,000 tons shipped about 45,000 tons were sent to Nova Scotia, Quebec and Ontario, the remainder going to the United States.

Falconbridge Nickel Mines concentrated its attention on exploring the areas around Gull Lake, Tilt Cove, Rambler and on its concession area some five miles from Springdale. The old York Harbour mine at York Harbour was unwatered by the Independent Mining Corporation and *The Northern Miner* reports that following a detailed examination of the property by a consulting geologist, drilling was resumed on the old levels as well as on the surface. At Gregory River, the Cape Copper Co. began a diamond drilling programme, the first results being encouraging; Pilley's Island Copper-Pyrite, Ltd., carried out an extensive drilling programme at Pilley's Island but at Barachois de Cerf, the Mindus Corporation dropped its option over a group of lead-zinc claims.

In Labrador, the Iron Ore Co. of Canada continued its exploration programme on its Newfoundland-Labrador properties and substantial additional iron ore reserves were indicated. In the summer months of last year Frobisher, Ltd., carried out exploration work in the Seal Lake-Nascopie River area, the interesting copper deposits discovered calling for exploration work sometime during the current year.

The Newfoundland Government were also active in the mining sphere and undertook a reconnaissance geological survey of some 6,000 sq. miles in east-central Newfoundland from Fortune Bay to just south of Fogo Island. This programme was supported by ground magnetometer surveys over certain discoveries of peridotite, some of which were observed to carry asbestos mineralization. The Newfoundland Government also assisted in the investigation of the Lewis Brook asbestos deposits belonging to Newfoundland Asbestos, Ltd. Results were encouraging and it is hoped that the continued programme will block out sufficient tonnages of minable asbestos to warrant the establishment of mining and milling operations.

Of particular interest during the past year was the news that the Newfoundland Government was informed that a financial group in Boston plan to begin an oil exploration programme starting about April or May next. In this connection, a report just to hand states that, currently, an oil region on the west coast near St. Paul's is being investigated by a wealthy American financier.

#### Australian Tin Industry Seeks Encouragement

The Australian Tin Producers Association are recommending that the Australian tin industry receive a guaranteed price of at least £A.1,000 per ton for the next ten years, or alternatively that the Australian price, which is fixed far below world market levels, be abolished. This recommendation has been submitted to the Commonwealth Commerce Minister as a necessary step to preventing the industry from collapse. In support of its case, the Association pointed out that the Australian tin output in 1951 was at least 10 per cent below the 1950 total of 1,883 tons and less than half the 1941 production.

This situation would confirm what our Australian correspondent wrote in these columns in last week's issue in his assessment of the future of the Australian mining industry. The shortage of tin, he said, was acute and that there was little awareness on the Government's part of the seriousness of the situation. Taxation continued to frighten away private capital and the Capital Issues Board had, on occasion, refused application for capital for what were considered to be sound undertakings.

No doubt the Australian Tin Producers Association had these facts in mind when they pointed out to the Commerce Minister that provided tin producers were given "adequate inducement" they could recover at least another 1,000 tons of concentrates annually from sluicing, dredging and alluvial operations in various parts of Australia.

## Australia

(From Our Own Correspondent)

Melbourne, February 1

Australia's position in regard to the production of copper for domestic needs is causing considerable concern and it is recognized that, in existing circumstances, aluminium must be used largely as a substitute for copper to overcome the shortage for defence and essential civil projects. It has been stated that the country's requirements of copper are 70,000 tons per annum, a figure which is much in excess of estimates previously published, and possibly somewhat inaccurate. The Government has been considering interim plans to increase production to bridge the gap until aluminium production can be commenced in 1954. One proposal is to increase the capacity of the smelting and refining works at Port Kembla, New South Wales, but this will in no way increase the supply of ore, or of blister copper, which is the vital factor. Such an increase can be looked for from Mount Lyell; from Mount Morgan, from which greater output is possible from the Sugarloaf deposits, but as yet some years ahead; and from Mount Isa. There are no new or old deposits capable of re-opening that can give immediate production, and active encouragement should therefore be given to the potential small operating company. The situation at Mount Isa Mines must be regarded very seriously, for this mine has aimed at the production of 18,000 tons of copper per annum, to commence this year, but the objective is gravely endangered by industrial awards covering bonus payments, which the Company ineffectively tried to have modified. The Company has made clear that production of copper is not possible under the existing provisions of the lead bonus payment and, in accordance with this view, dismissal notices have been given to 100 men. The continuance of the great copper project is now in the balance.

#### WOLFRAM

The wolfram boom seems to be pausing on a peak. The search for new occurrences, or abandoned mines with at least some prospects, continues, but company flotation and acquisition of leases has ceased for the time being. Some early enterprises are about to face the test of production; some may operate profitably at the current metal price; others will prove to be party propositions and unsuited for company operation; but these will have provided the share market gamble which, in instances, is the most attractive purpose of the flotation.

Treatment plants are in course of erection, mostly of small capacity; some incorporating that curse of tin and wolfram milling, the stamp battery; others are favouring the sound practice of roll crushing. One or more portable, sectionalized crushing and concentrating plants are under construction, but it has yet to be seen if they adhere to a standard design, or will provide flexibility to permit the adoption of a flow sheet, and modifications of mechanical units, to suit the peculiarities of differing ores. They may have a field on the small, narrow vein occurrences, but suitability for mines of larger output, and for variety in terrain, is open to doubt. Estimates of average grade of ore will now be put to the proof, with the governing factor of recovery too often overlooked or optimistically taken for granted. Costs, also, are an uncertain factor, particularly in the mine of small, narrow and irregular orebodies, involving high development and stoping charges, which will take high metal prices to balance. It is certain that tungsten production will be increased, but this year will show how many of the boosted prospects will survive into 1953. There is nothing, so far, to suggest the development of a major producer among the new enterprises.

# Canada

(From Our Own Correspondent)

Burks Falls, February 8

The mineral industry of Canada during 1951 spearheaded the beginning of the greatest industrial expansion so far in the history of this country. Preliminary estimates as prepared for *The Mining Journal* show mineral output for 1951 rose to approximately \$1,230,000,000 compared with \$1,045,450,000 in 1950 and \$901,110,000 in 1949. This rising tide of mineral production gave birth to worldwide interest in the magnitude of the natural resources which await development in Canada. As a consequence, additional public and private investment in industrial expansion during 1951 soared to an aggregate of some \$4,600,000,000.

Expansion spread all across the full breadth of Canada, from the great new iron ranges of Quebec and Labrador on the Atlantic Seaboard, to the huge aluminum works on the Pacific Coast of British Columbia. In the intervening space between these distant shores separated by 3,000 miles, the central provinces wove their individual tales of growth associated with the mining of gold, nickel, copper, zinc, lead, platinum, silver, asbestos and many other minerals—including the increasing flow of petroleum and natural gas.

### ONLY GOLD PRODUCTION DECLINED

The mining of gold was the only important branch of the mining industry to experience a decline in activity. During the year the output of gold declined to 4,330,000 oz. with a value of \$159,410,000. This compared with an output of \$168,988,600 in the preceding year. The decline was caused by rising costs of labour and material employed in the production of the yellow metal, whereas the value of gold itself remained fixed. The outlook is that output may suffer a further decline during 1952 unless costs decline or the world price for gold increases. Never before in Canada's history was the incentive to search for and develop gold mines as low as it is in these early weeks of 1952. Yet, were economic conditions to reverse themselves through a higher price for gold and a lower cost of production, the indications are that gold mining might be expected to rise to still greater records than ever before. The fates of gold mining, therefore, hang upon the end of a pendulum which sooner or later may begin to swing the other way.

Nickel output, based upon the activities of International Nickel Co. of Canada and Falconbridge Nickel, rose to 275,000,000 lb. valued at \$151,000,000. This compared with \$112,104,685 in 1950 and \$99,173,289 in 1949. The outlook is that a further substantial increase may be recorded during 1952. The price of nickel has risen to 58c. per lb., and all indications point toward an output of around 290,000,000 lb. during the year now begun. While output is confined to the Sudbury and Copper Cliff area of Northern Ontario, yet a new nickel deposit of considerable importance is in an advanced stage of development by Sherritt-Gordon Mines in Northern Manitoba. So great is the demand for nickel, government allocation is being exercised in all countries. On the "grey" or "black" markets the metal is said to sometimes command prices as high as \$2 to \$3 per lb.

Copper production during 1951 rose to over 540,000,000 lb., with a value of close to \$150,000,000. This compared with \$123,211,000 produced in 1950 and \$104,719,000 in 1949. The increasing world demand and the prevailing high price for copper spell out the prospect of continued growth of this branch of the Canadian mining industry.

Zinc output increased to 668,000,000 lb. in 1951 valued

at \$132,900,000. This compared with \$98,040,000 in 1950 and \$76,372,000 in 1949. The outlook is that output of zinc may rise to around 700,000,000 lb. during 1952.

Lead production declined to 305,000,000 lb. during 1951 compared with 331,394,000 lb. in 1950. However, due to the higher prevailing price, the 1951 production rose in value to over \$56,000,000 compared with \$47,800,000 for the 1950 output.

Asbestos production advanced to 968,000 tons with a value of \$79,000,000 during 1951 compared with \$65,854,000 in 1950. New developments in progress suggest an output of more than 1,000,000 tons may be reached in 1952.

### THREE MAJOR DEVELOPMENTS IN PROGRESS

The three major new developments now in progress in Canada are in connection with the iron ore deposits of Quebec and Labrador, the petroleum fields of Alberta and Saskatchewan, and the great aluminum works being established at Kitimat in British Columbia. It has been estimated that some \$300,000,000 to \$400,000,000 will be invested in the task of preparing the new iron fields for production of 10,000,000 tons a year, and with tentative plans for 20,000,000 tons annually. Likewise, an estimated \$550,000,000 is to be spent on the Kitimat aluminum enterprise—including the building up of a new modern city of 25,000 to 30,000. As for the petroleum developments, it is significant that in 1951 the output rose to 48,000,000 bbl. and is rising rapidly. This compares with an output of 29,000,000 bbl. in 1950 and 21,300,000 bbl. in 1949. A new pipeline from the oilfields to the head of the Great Lakes was completed at a cost of \$90,000,000 during 1951. A second pipeline has been approved for construction this year from the oilfields to the Pacific Coast—Involving the engineering feat of crossing the Rockies, one of the world's greatest mountain ranges. Plans are under consideration for laying a transcontinental pipeline through which to deliver natural gas to industrial centres in Canada from coast to coast.

### FUTURE EXPANSION LIES ON THE FRINGE

While Canada has already played an important rôle in the production of uranium, the development of additional large new deposits in northern Saskatchewan has reached such scope as to suggest this country may soon take its place in the very forefront of nations in the production of this element—prized to greater extent than any other worldly possession in what may be the beginning of a new era in the history of science and mankind.

In making this survey of mining and industrial achievement, together with the flood of capital for participation in inevitable further expansion, it is not possible to escape the thought that the area of activity lies along the fringe of vast new lands—and that beyond this fringe lies a virgin area which beckons its challenge to pioneers—and will probably continue to beckon for generations to come.

### MINERAL OUTPUT BY PROVINCES

Province	1951 \$	1950 \$
Ontario	437,000,000	366,800,000
Quebec	250,000,000	220,200,000
Alberta	173,000,000	135,800,000
British Columbia	168,000,000	138,900,000
Nova Scotia	59,000,000	59,000,000
Saskatchewan	51,000,000	36,000,000
Newfoundland	33,000,000	26,000,000
Manitoba	28,000,000	33,000,000
New Brunswick	10,000,000	13,000,000
Yukon Territory	10,000,000	9,000,000
Northwest Territory	8,000,000	8,000,000
Total	1,227,000,000	1,045,700,000

# A Survey of Uraniferous Deposits in Cornwall

By PAUL STEIN, A.C.S.M.

After considerable research into the papers of Henwood, Collins, Dewey, Penrose and others, the author carried out preliminary investigations into the potential sources of uranium ores in Cornwall. While he makes no claim that his investigations have circumscribed Cornwall's uranium potential, as the extent of his examinations depended largely on quick results, he hopes that the following notes will give a bird's eye view of some of the areas in Cornwall meriting further investigation.

With the discovery of large high-grade uraniferous deposits in the Belgian Congo and in Canada's North West most people have come to associate the occurrence of this important strategic mineral with trackless, uninhabited areas. Yet, it is possible in this country to alight from a local bus and, equipped with only a home-made Geiger Counter to obtain readings proving the whereabouts of radio-active minerals. In some ways, perhaps, it is unfortunate that this can be experienced in Cornwall as that county has come to be regarded by many as something of a mining sphinx neither beckoning nor deterring the venturesome prospector.

In the article which follows results are recorded of nine months' field work in different areas in Cornwall where previous research yielded sufficient evidence of radioactive minerals to warrant further examination.

The following modes of formation of uranium deposits in Cornwall are considered possible:

1.—Late accessory mineral in the tin-copper lodes filling fresh fissures caused by the widening of the lode, and also in small veinlets branching at various angles to the main lode.

2.—A lode mineral filling fissure veins in or near the granite formed later than the main tin-copper lodes of the district. South Terras and St. Austell Consols provide good examples of this formation, the cobalt/nickel/uranium lodes striking at right-angles to the main tin-copper lodes. At Trenwith, St. Ives, uranium mineralization is said to extend 40 ft. into the country rock from the main lodes which is a typical example of this type of deposit.

3.—It is possible that occurrences of thucholite, a uraniferous hydrocarbon which is playing an important role in uranium recovery on the Rand may be found in Cornwall. This mineral is believed to originate from a reaction between pitchblende and hydrocarbons followed by a re-distribution in the thucholite complex form.

Investigations at Wheal Edward indicate that in the same way as enriched zones are found at the junction and intersection of tin-copper lodes, such a condition also favours very enriched secondary mineralization of uranium when present.

## EXPLORATION EQUIPMENT

Three types of instruments were used all having the same dimensions, 6 in. x 6 in. x 6 in., and weighing 5 to 5½ lb. The first type of instrument used was a counter with aural indication only, via headphones. This was used for routine prospecting for surface outcrops; for pre-concentrating by hand the broken ore in the stopes or dumps and for the appropriate estimation of values underground. The second type of instrument afforded the same facilities as the first type but differed in that it contained a meter with which accurate comparisons could be made against standardized amounts of radio-active materials or with sampled zones in lodes. It was also used in assaying mill products during ore testing and production of bulk concentrates. Chemically assayed standards were used to plot a graph of standard values against meter readings. After the graph was complete, the unknown sample was measured and the meter reading obtained gave an assay

value after reference to the graph. The reason this procedure was adopted was to avoid the accuracy of the results obtained being affected by battery voltage variations, and ageing of electronic components. Greater accuracy of results could be obtained by the use of more elaborate equipment, but this would have involved an increase in the weight and cost of the equipment.

The third instrument employed was a counter similar to the first type mentioned above but also included the addition of a small self-contained transmitter in the container of the true counter. This instrument was designed to obtain information from dangerous or from inaccessible parts of mines by lowering it into the area to be investigated, information being received either visually or aurally via a standard radio receiver.

All the instruments stood up to the most severe conditions even surviving a fall of some 15 ft. down the face of a cliff. The Geiger Muller tubes were made by Cinema Television, Ltd. All other parts used in the production of these instruments were standard radio components the counter being manufactured and sold under the trade name, Radiometrics.

## LOCATION OF DEPOSITS

In the following paragraphs results are given of the areas surveyed, the most promising of which proved to be around St. Just.

*St. Just*.—Five mines in the area merit reference, Wheal Edward, Geevor, Levant, Botallack and Portheras Cove. *Wheal Edward* yielded significant amounts of uranium and details of the investigation carried out at this mine are described subsequently. *Geevor* yielded copper uranium carbonates assaying better than 10 per cent  $U_3O_8$  on some of its upper levels. Radio-activity was also present in some of the dumped products though it is doubtful whether economic recovery of some of the uranium content could be made using generally known methods of extraction. At *Levant*, calciner residues were found to have a very low radio-active content which again presents a problem for the extraction metallurgist. *Botallack* and *Portheras Cove* yielded excellent hand specimens. In fact, the best specimen found during investigations came from Botallack. It weighed over 60 lb. and had a  $U_3O_8$  content of over 40 per cent.

*St. Ives*.—*Trenwith Mine* was formerly a famous uranium producer, its products being used in the early part of this century for the production of radium. During the early history of Trenwith a black, heavy mineral believed to be rich in copper was mixed liberally with true copper ores. Smelting of these parcels was most unsatisfactory and penalties were imposed, thus raising production costs. Subsequently, the black mineral was identified as pitchblende and relegated to dumps or left *in situ*—to yield a rich reward to the radium producers. *Wheal Providence* near Carbis Bay yielded fair amounts of secondary uranium minerals which may have come from an underground zone of oxidization. From experience gained at Wheal Edward it is considered that dump oxidization is unlikely. This mine is probably more interesting than Trenwith as old records indicated that the full

depth of the copper zone had not been reached. No outcrops of uranium mineralization were found along the cliffs between Providence and St. Ives.

It is relevant to state here that dumps which appear to have yielded most of their uranium content to the unaided hand picker may still yield good values to a man guided by a counter. Even better would be the use of an electronically controlled picking belt which automatically "kicks off" uraniferous particles. Such equipment is in use in Canada and the construction of a similar machine for treating Cornish uraniferous minerals is being considered by the author.

#### CAMBORNE-REDRUTH AREA

*Camborne, Redruth.*—The dumps at Dolcoath, South Tresavean, Buller, South Bassett and Pool have been hastily surveyed. While sundry poor specimens were found at several of the dumps, the area shows little promise when compared with either St. Just or St. Ives. This statement may stand in need of some qualification as no detailed surveys were carried out at Peden-an-drea, Tin-croft and Bassett Mine near Porthowan and past records of these mines show that uraniferous minerals were present in the workings. Furthermore, quantitative assays have not yet been carried out on the products of British Malayan's plant at Wheal Bassett which are all slightly radio-active.

*St. Stephens.*—South Terras "radium mine" near St. Austell was alleged to have come into being with the discovery of torbernite in a nearby quarry. Operations at the mine were carried out by the Société Industrielle du Radium Ltd. between 1913 and 1927 with a total estimated reserve of 36 gms. of radium available in broken material. The British and General Radium Corporation took over the mine in 1927 and began exploring for further ore bodies. After a period of time the mine was allowed to become derelict, presumably reserves located being insufficient to warrant economic working, but to-day after Geiger surveys, it is considered to be worthy of further examination. The mine is in very bad country from the point of view of flooding, and pumping charges are liable to be high. From a survey of the areas near the old mine it would appear that a limited pitting or drilling programme should be carried out in order to find any extensions of the old lodes. During previous operations the lode became impoverished in one direction and was intersected by an elvan dyke in the other, the continuation of the lode not being discovered. If additional quantities of low grade secondary ore (i.e., Autunite and Torbernite) can be located at other mines, it is probable that existing dumps could be treated economically by a leaching process.

Other mines in this area worthy of investigation, but yielding nothing of interest in their dumps, are New Crow Hill, Egloshallen, Tolgarrick, St. Austell Consols. In general, it can be said that if a dump contains even small amounts of uranium minerals some increases above the normal background count is observed.

#### MISCELLANEOUS AREAS

*Miscellaneous Areas.*—The following areas and specific mines have all been mentioned in past records and other source material as containing uranium in their products. The mines, Ting Tang, Tolcarne, Gorland and Unity in the Gwenapp area, the East Wheal Lovell in the Wendron area, and Wheal Herland in the Gwinear area. Elsewhere, specific mines coming into this category are Gunnislake, Fowey Consols, Phoenix district near Liskeard and Bedford United. Some of these mines have been investigated but have not yielded any significant amount of uranium.

#### INVESTIGATIONS AT WHEAL EDWARD

This mine appeared promising for the following reasons: significant amounts of uranium oxide could be extracted from surface dumps; definite, but unknown reserves of ore were discovered underground; access to the old workings was reasonably easy, and the ground not particularly treacherous.

Using Geiger Muller counters, the surface dumps were worked economically for one month. A mill feed containing 8.5 per cent uranium oxide was obtained by hand picking pre-concentration. The best head product, after stamping, classification, and tabling contained over 50 per cent  $U_3O_8$ . However, considerable difficulty was experienced in recovering values from the fines but, by suitable mixing of products, with the addition of unconcentrated high grade portions of the ore, a final product, containing 42 per cent  $U_3O_8$  was supplied to a chemical manufacturer to be used in making high-grade uranium chemicals.

During extraction tests, before the full scale milling plant was run, counters enabled rough assays of products to be made in few minutes. On the full scale run, the counter was again used to check tailings for excessive  $U_3O_8$  content. Due to this checking, the escape of high values in the tailings from a "slime table" was detected during milling, and diverted from the waste launders, and resulted in a 15 per cent  $U_3O_8$  product.

The only significant impurity in the final product was chalco-pyrite, but this could be eliminated by flotation if a grade higher than 40 per cent  $U_3O_8$  is required. These high concentrations may be attributed to the preconcentrating up to 8.5 per cent  $U_3O_8$  product.

It was considered that the low-grade ore available at Wheal Edward would be best treated by leaching, this being confirmed by the difficulty found in gravity concentrating the finer sized fraction, and associated losses from the slime table. Most of this low grade ore consists of minute veinlets in the country rock, it requires grinding to a fine size, and is yet to be milled.

It was considered desirable to obtain some information before actually descending into the old workings. To achieve this the counter, with the radio transmitter, was lowered into various shafts, winzes and stopes, the information required being radiated by the transmitter and received on a radio receiver located at a safe position in the mine or at the shaft collar. Enough information by this method was obtained to show where the investigations should be started.

#### ONLY TWO LEVELS SO FAR EXPLORED

To date, only two levels underground have been explored; these run in two lodes, and by far the richest portion of the uranium minerals *in situ* lies near the junction of the lodes.

On the shallow adit level, the normal means of entry into the mine, a small lode of secondary minerals, autunite and torbernite, lies in the footwall and appears to diverge from the main worked-out copper lode. Near this lode was found a former attempt to search for a further copper lode, the material from this work carrying some 2-3 per cent  $U_3O_8$ . Some very high grade waste fill was found on this level, also one or two minor leaders intersecting the main lode, and carrying uranium.

After a ladder had been installed to allow further exploration on the level some 30 ft. below shallow adit, some ten tons of uraniferous waste fill were immediately discovered, but this material is probably most suitable for leaching, as most of the uranium is in the form of secondary oxides and phosphates.

Recently a lode of autunite-torbernite, some 6-8 in.

wide, was discovered *in situ* near the junction of the lodes. Sampling indicated that, if the grade holds throughout the readily workable part of this lode, an early production of  $\frac{1}{2}$  to  $\frac{1}{2}$  ton of  $U_3O_8$  is possible, provided the uranium can be extracted by a leaching process.

The dump material was mostly in the form of pitch-blende, and amenable to gravity concentration. However, the radio detector indicated that the lode, at present containing only secondary minerals, torbernite and autunite, exists at lower levels. It may, however, contain pitch-blende, since the majority of the dumped material was of this nature, presumably having come from below the oxidised zone. The most interesting levels of Wheal Edward lie between the shallow adit and sea level, but it is not expected that uranium production will have to bear the cost of pumping charges.

Should the working of Wheal Edward for uraniferous ores continue to be economically feasible, it is possible that the tin bearing portion of the lode may be reached before all uranium values are worked out.

Although economic tin values have not been proved, old records show that copper was the main product and that the tin zone was reached but not exploited at depth. For these reasons it is possible that the mine may possess a unique distinction by paying for its reopening and rehabilitation, from exploitation of the uraniferous values.

Assistance in the above operations has been received from C. K. G. Lamming, Esq., who has played a most active part in all exploration and practical mining; the Atomic Energy branch of the Geological Survey who have assayed many of the products and the Camborne School of Mines which provided ore testing and ore dressing facilities.

## Australian Beach Sand Deposits

(From An Australian Correspondent)

Important concentrations of zircon- and rutile-bearing sands occur at several localities on the Australian coast, the most important being along a 400 mile stretch of shoreline between Iluka, at the mouth of the Clarence River, New South Wales, and Fraser Island, in Queensland. Other deposits of possible value exist on the south-west coast of Western Australia.

Minerals of common occurrence in the eastern, or New South Wales and Queensland deposits, are zircon, rutile, ilmenite, monazite, chromite, and in the New South Wales areas, small quantities of cassiterite and gold. The value of the deposits is very variable and, in a large number of cases, the constituent minerals are mainly titaniferous magnetite, magnetic and other forms of iron oxide.

The source of the minerals is rather indefinite, for the nearest occurrences of extensive rock formations with which these minerals might be associated are some considerable distance inland and their presence along the coastline would involve long transport by rivers, with which the rounded shape of the mineral grains is consistent, but the specific gravities appear inconsistent with the distances of travel involved. Distribution along the shoreline has been effected by the gradual migration of river mouths and estuaries, and concentration has been brought about by continuous wave action along the present beaches and the earlier shorelines now lying at varying distances inland.

### THREE TYPES OF DEPOSITS

The deposits are of three types:

(1) *Front Beach Deposits*, between high and low tide levels, in which high concentration, which may be from 10 per cent to 80 per cent, has been effected by wave action.

(2) *Back Run Deposits*, lying behind the fore, or live dune, and in which a degree of concentration, at times up to 80 per cent, may exist.

(3) *Fixed Dune Deposits*, which occur behind the Back Run deposits at distances up to a mile or more inland, and which represent ancient shorelines. The intervening country may contain a little mineral, but the fixed dunes, particularly in the Clarence River-Evans Head area, carry zircon-rutile values in concentrations up to 35 per cent for a considerable distance; the width of these occurrences is from 50 ft. to 100 ft. or more, and the depth is 15 ft., or 20 ft.; the mineral concentration is in the lowest, 3 ft.

Fixed dune deposits in this locality were worked solely for gold and cassiterite about 1900.

Regional variation in the mineral composition of the sands is a feature of the deposits. Chromite decreases from north to south, and zircon increases; rutile, though variable, is fairly constant; gold and cassiterite occur at the southern end of the area, but in such small quantities as to be unimportant, and there is a decrease in ilmenite from north to south. Zircon and rutile are the important minerals throughout; ilmenite, though present in important quantity, is valueless because of the association of chromium. There is little variation in the grain size of the minerals.

Beach deposits lying between high and low water mark must be worked at low tide. Methods involve the removal of overburden by scoop, scraper, bulldozer, or hand shovel; the economic material so exposed is transferred to motor trucks by hand, or by mechanical loaders for transport to the treatment plants. Inland deposits, which may be, in part, below water level, can be worked by dredges or dragline excavators.

### ORE DRESSING IS NOT DIFFICULT

Ore dressing is not difficult, as there are no composite particles and the grain size of the minerals ranges within narrow limits. Silica-free mixed concentrate is produced by concentrating tables, and also by Humphry Spiral Concentrators, which latter machine is becoming popular for this work, the capacity per unit, treating this material, being one ton per hour. Separation of the constituent minerals in the primary concentrate is effected by magnetic separation, electrostatic separation, or by flotation.

In magnetic separation, ilmenite is removed by low intensity machines, but high intensity separation is necessary for the removal of minerals such as monazite or tourmaline, the latter of which occurs in places. Electrostatic methods are favoured for separation of zircon from rutile and, at one mine, flotation is used for the production of high-grade zircon concentrate from the primary gravity concentrate, and by its rejection of quartz, rutile, and all other minerals is practically complete; zircon in the tailings can be recovered by electrostatic separation, the remainder is high grade rutile.

The use of electrostatic separation for the production of zircon concentrate could permit more quartz in the original gravity concentrate, and thus a higher recovery could be made at this stage.

# Some Recent Developments in Shallow Bath Heavy Media Coal Washing Plant

By H. Y. ROBINSON, M.Sc., M.I.M.E.

The following article is reprinted from University of Durham, King's College, *Mining Bulletin* (No. 1, Vol. 5, Series Coal Cleaning—No. 6), by permission of the Committee, to whom acknowledgment is also made for permission to reproduce the accompanying illustrations.

Since the introduction of the Chance process in the nineteen-twenties, the heavy media coal washing plants built in this country have been predominantly deep bath units. Following the Chance process, using a suspension of sand in water, there came the Barvoys process using a suspension of finely ground barytes and clay, and also the Tromp process with its suspension of magnetite in water. The two latter processes were introduced in 1934.

More recent developments in heavy density separation have brought about the introduction of shallow bath units, the first of these being the Dutch State Mines loess washer which was first operated in 1937. Originally the suspension used in this process was one of loess in water, the dilute suspension being reconcentrated in a cyclone thickener. The feed to the washer was + 8 mm. and it was capable of handling 40 tons per hour. The loss of medium averaged 4 lb. per ton of feed. Experiments were also made with the use of a magnetite suspension, but at the present time a suspension of froth flotation tailings in water is being used.

In this article, however, the reader's attention is drawn more particularly to the development of shallow bath units using magnetite suspensions. The first of these installed in this country was at Derwenthaugh in 1944 and this Ridley-Scholes coal washing plant was described in a previous Bulletin (No. 2 Series: Coal Cleaning No. 1). Little has been written in this country about other systems incorporating shallow baths some of which are mentioned in one of the appendices of the "Plan for Coal." Commercially perhaps the most important are the Nelson Davis and Link-Belt separators which have been developed in the U.S. but, from a purely scientific approach, the "Laminarstrom Washer" developed by Dr. Vogel, represents an important development.

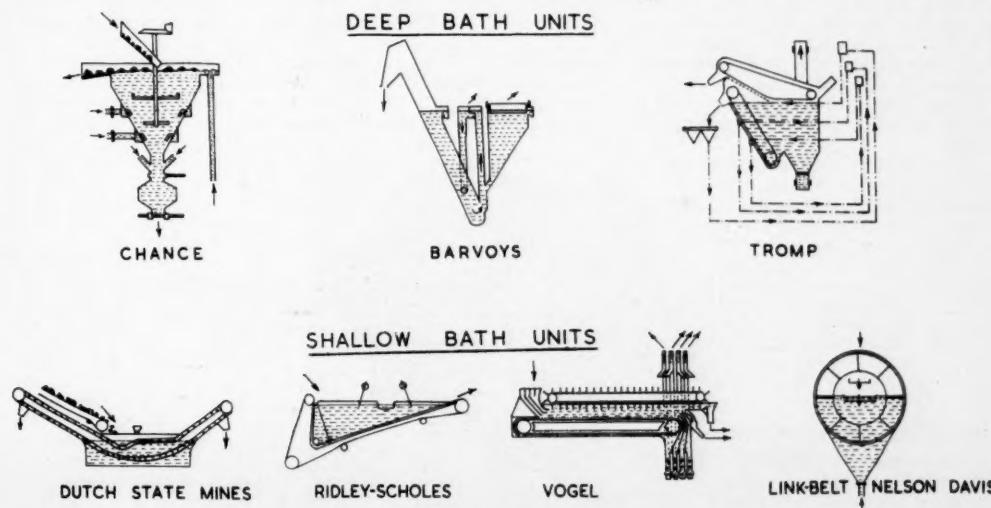
The diagram below shows the trend of development from deep to shallow baths. The earlier processes, which are illustrated in the upper portion of the diagram, operate with bath liquid depths of 15 to 20 ft., whereas the later systems shown in the lower portion, operate with liquid depths generally less than 5 ft.

## THE VOGEL LAMINARSTROM WASHER

The streamline flow washer was developed by Dr. Vogel in Germany during the Second World War when the need for very accurate coal cleaning and the production of ultra clean coal became increasingly essential. Two experimental units each handling 8 tons per hour were installed at the Königin Elisabeth mine for the treatment of — 10 + 1 mm. raw coal, the first bath handling the — 10 + 4 mm. fraction and the second — 4 + 1 mm. As shown in the diagram on page 200, the washer consisted of an elongated rectangular tank, in which an unstable suspension of finely ground magnetite was used as the separating medium, being introduced through a series of parallel jets, thereby producing laminar flow, which is the basic principle of the method. A specific gravity of 1.35 was maintained at the surface, and medium and material flowed along the bath at substantially the same rate. When stratification was completed, several products were removed in layers by a series of adjustable take-off knives and draw-off outlets arranged at various horizons.

Dr. Vogel adopted magnetic recovery and magnetic control of flocculation and dispersion of the magnetite suspension. The application of these processes, as developed in the Nelson Davis and Link-Belt processes in the U.S.A. is described later in this article.

After the war, there was no longer the same urgency for ultra clean coal and, in view of the very low through-



put, Dr. Vogel, while maintaining his principles of laminar flow, carried his experiments a stage further and developed a washer using a troughed belt conveyor as the separating bath. The pilot plant was built in the spring of 1949 at Lauthenthal.\*

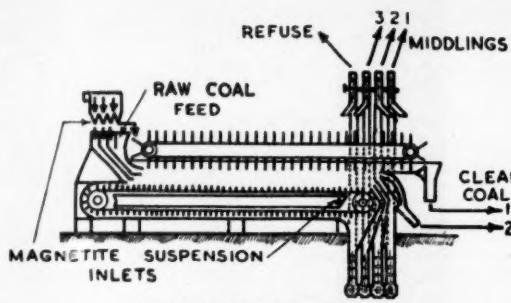
#### TROUGHED BELT CONVEYOR AS SEPARATING BATH

The heavy medium is fed into the troughed belt with constant speed and direction, the uniformity being obtained by feeding the medium of finely divided magnetite through a suitable nozzle or jet. In the pilot plant a 70 mm. nozzle is fed by an overflow at certain pressure. The raw coal must also be fed into the trough at a similar velocity and this is achieved by a vibrating feeder situated just behind the first nozzle. Provision is made in the experimental plant for the coal and medium to be passed through a second nozzle but this will probably be dispensed with in commercial installations. Coarse as well as fine particles can be treated in this washer, but in order to get accurate separation the thickness of the layer of raw coal fed to the bath should not exceed the size of the largest particle. Again the depth of the bath should be 2.5-4.0 times the size of the largest particle. For finer particles up to 10 mm. a depth of 70 mm. has been adopted, due allowance having been made for the layer of water 20-30 mm. deep which forms during the separation. The belt speed under such conditions should be 1.25 m./sec. For larger particles of from 10-80 mm. it is reported that the depth of the bath would be 250 mm. and the belt speed 2.25 m./sec. although this may be reduced to 1.55 m./sec. At the outset, Dr. Vogel urged the installation of a belt 15 m. long, but due to lack of space it was restricted to 5 m. It has, however, been found that the length of the belt should indeed be between 10 and 20 m., being shorter for coarse particles and longer for fines. In the pilot plant the belt is 800 mm. wide; its lower leaf is flat, but on passing over the return drum it is bent over by a set of lateral rollers giving a trough 500 mm. wide. At the discharge end of the bath there is an adjustable tongue which separates layers of lower ash content from those of higher ash content, and enables the two products to pass out to the appropriate drainage screens. It is intended to install a magnetic separator for recovery of the magnetite in the second pilot plant.

It is claimed that the installation costs of this type of washer will be low compared to other plants as it will be possible to install it all on a single floor level, this being one of the outstanding advantages common to shallow bath separators. This is an important development in that it is an attempt to extend the range of heavy media separation down to a size (say 0.75 mm.) below which froth flotation will be applicable.

#### THE NELSON DAVIS SEPARATOR

The processor is cylindrical in shape, its longitudinal axis being horizontal, and within the stationary



The Vogel "Laminarstrom" Washer  
Diagram clearly shows the clean coal conveyor, the refuse scraper and the elevators for disposal of refuse and middlings.

diameter 10 ft. Each end ring has a machined cast steel tyre fitted concentrically to it and the entire rotor assembly is supported on two pairs of rollers mounted on shafts turning in pedestals on the outer casing.

The rotor is positively driven by sprockets engaging pin racks secured to each of the tyres. The peripheral speed of rotation is about 35 ft. per minute. Normally a 7½ h.p. electric motor is used to drive the rotor, but actually the horse power required is about four. As the driving mechanism is above the medium level, it is not subjected to excessive wear.

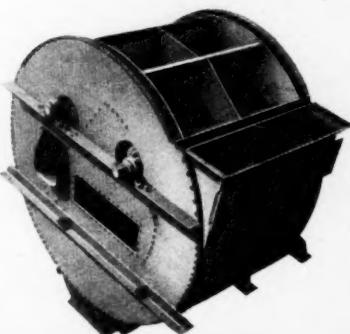
A trough plate terminating well beneath the medium level is welded to the end plates of the outer casing so that the compartments travel between the trough plate and the outer casing.

#### PREVENTING THE ENTRAINING OF SINKS

Raw coal, after being pre-wetted, is introduced near the top of the separator and is contained in the rotor compartments, each being nominally half full. As the rotor revolves, the feed is lowered into the medium where an initial separation takes place. The sinks resting on the flights between the compartments continue to travel down into the bath while the floats are caught by the succeeding flights and forcibly submerged. When the compartments reach the lower limit of the inner trough plate near the bottom of the bath, the floats are able to rise to the surface of the bath and are discharged over a weir by overflowing medium. This treatment prevents the entraining of sinks.

When the sinks reach the lower portion of the bath they are no longer able to slide forward behind the flights and they spread out in the path of the following flight and entrained floats are able to rise to the surface. The oncoming flight bunches the discard and forces it forward over a perforated grid plate through which part of the heavy medium enters the bath. This effects a final purging of the sinks and the clean discard is elevated by the flights, drained and discharged into a sluice.

The clean coal and discard are passed to drainage screens. The first section of each screen provides for mechanical drainage of the medium from the clean coal and shale and it returns directly to the heavy medium storage tank. On the second section of the screens the adhering particles of medium are sprayed off and finally the products are de-watered.



The Nelson Davis Separator

The underflow from the screens is recovered in a magnetic separation system as is clearly shown in the diagram below.

#### THE MAGNETIC SEPARATION SYSTEM

The dilute medium passes through magnetizing blocks to produce flocculation and is settled in a rake-type thickener. The thickened medium is fed to a magnetic separator which consists of rows of induction magnets having an overall width appropriate to the capacity and a total length of approximately 6 ft. over which rides a rubber conveyor belt. The feed box is located some distance from the bottom. The slope of this portion of the separator is 45° to the horizontal so as to permit the non-magnetic particles of slurry in the feed to flow downwards over the surface of the belt while the magnetic particles cling to the belt as it travels upwards towards the point of discharge. The magnetic concentrates are then demagnetized and returned to the heavy medium storage sump while the tailings are passed to the water clarification sump.

The loss of magnetite is reported to be very small.

Due to the abrasive nature of the circulating medium the more important sections of piping and elbows are generally of rubber or rubber lined steel and are of such proportions that the rate of flow is less than 8 ft. per second.

It is reported that this system is very efficient over a range of specific gravity from 1.30 to about 1.60 or 1.65, and that the system affords considerable saving in process water so that water clarification problems are reduced. When necessary two processors can be operated in series so as to handle a middlings fraction. The normal practice in such a case would be to operate the primary processor at a specific gravity of, say 1.35 and a secondary processor at, say, 1.50. When the associated discard disintegrates rapidly in water this order would be reversed, *i.e.*, the primary bath would operate at a specific gravity of, say, 1.50 and the secondary at 1.35.

The process is flexible as the bath can be operated with or without the upward current of heavy medium used for

purging the sinks. When this current is shut off, overflow of floats at the hydraulic weir is maintained entirely by heavy medium introduced at the surface of the bath and very clean coal is obtained. The processor can also operate with the surface inlet closed when all the heavy medium is admitted through the bottom of the vessel and a clean discard would be produced.

Although the Nelson Davis system is a recent development, it is of interest to note that units dealing with up to 300 tons per h. are projected. For this capacity the rotor will be 10 ft. in diameter and 6 ft. long and, for a feed of 100 tons per h. the plant will be as previously described, the rotor being 10 ft. in diameter and 3 ft. long. For medium recovery one 36 in. magnetic separator is incorporated in the flowsheet for the smaller plant whereas the larger assembly will have two magnetic separators respectively 48 in. and 24 in. wide.

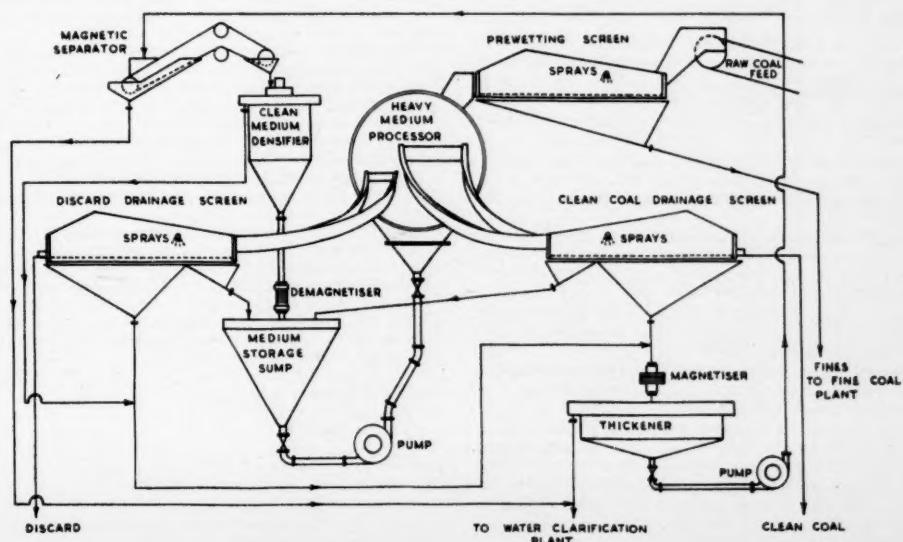
#### THE LINK-BELT CONCENTRATOR

At the time of the publication of the National Coal Board's "Plan for Coal," two plants incorporating the Link-Belt process were at work in the U.S.A. and were reported to be operating quite successfully.

The Link-Belt concentrator consists of a cylindrical tank which contains the liquid medium and within which there is a rotary elevator rather similar to that already described. The raw coal enters the bath axially and the clean coal immediately passes out over the discharge weir on to a drainage sieve while the sinks are delivered by the perforated lifter shelves of the rotor to a reject flume. The magnetic system of medium recovery, similar to that shown in the illustration below, is adopted.

Although it remains to be seen whether this process will be adopted in this country, it is interesting to note that one plant, which has been operating in Pennsylvania for some time, has given results so satisfactory that several other installations are projected.

\* "Heavy Medium Washing Trough on a Troughed Belt for the Treatment of Run-of-Mine Coal," by J. R. Schoenmueller, International Coal Preparation Conference, Paris, June, 1950.



## TECHNICAL BRIEFS

### "G.E. Micamat"

A new method of producing mica insulators has been announced by the chemical division of the U.S. General Electric Co.

In the new process, domestic mica is pulverized and the impurities removed. The microscopic flakes are then subjected to a special treatment forming them into a continuous sheet which can be produced in thicknesses ranging from .002 to .006 in.

The new product "G.E. Micamat," is claimed to have better dielectric properties than natural mica products. This is attributed to the fact that the new product has greater uniformity of thickness and to the absence of holes. It can be impregnated with resin and bonded to glass, paper and cloth. Production on a commercial scale is planned for the current quarter.

This new process may make the country independent of foreign mica supplies and may necessitate the re-opening of the mica mines in the United States. At present the bulk of the mica flake used in the electrical industry is imported from India.

### Manganese Sulphate From Bog Ore

According to a Reuters report from Copenhagen, plans for the establishment of a plant in Jutland for the manufacture of manganese-sulphate from bog ore are now so well advanced that production is expected to begin in the latter part of this year. The plant's estimated annual capacity is 1,000 tons of manganese sulphate or more than double Denmark's total consumption. Thus about 500 tons of manganese-sulphate will be available for export.

Denmark has recently exported considerable quantities of bog ore to the Ruhr industry which contains too small a manganese content to make its extraction economically worthwhile, but its quality is considered good enough to supplement German stocks of high quality iron ore.

Denmark started to export bog ore for gas fortifying purposes in 1947, since which date exports have increased by 300 per cent, amounting in 1951 to 30,000 tons. Recently, the Danish authorities banned the export of bog ore having a manganese content of more than 10 per cent, in order to conserve supplies of this quality for the home industry.

### German Research on Peat Utilization

A new method for the utilization of peat has been described recently by Professor Terres, a well-known German fuel expert.

Instead of the usual technique of trying to dehydrate the peat—a process which consumes much energy—still more water is added to it and the resulting sludge is heated under pressure to 400°F.

In this way, the colloidal parts of the peat are broken down and can then be separated from the bulk of the water by centrifuging. During this first part of the process heat must be supplied.

The separated product is next heated up to about 500° F., a reaction takes place in which carbon dioxide and water are formed, while the peat is transformed into "peat coal" which is said to be equivalent to bituminous coal.

During this reaction heat is developed and the surplus of heat produced here over that consumed in the first stage is used to produce high-pressure steam.

The peat coal is claimed to have a good calorific value, it can be briquetted and is also suitable for producing coke, together with a high output of gaseous products.

The process can also be directed in different ways so as to produce directly either generator gas or a gas containing a high percentage of methane and ethane.

At present, only the development stage has been reached and no claims are made that all the difficulties are solved. It seems, however, that the process may lead to a better use of the large peat deposits in Germany.

### New Process for Beneficiating Arkansas Bauxite

A new process for beneficiating Arkansas Bauxite ores that have a high iron content—ores that up to now have not been utilized for the commercial production of alumina and abrasives—is described in a U.S. Bureau of Mines report, released by the Secretary of the Interior, Oscar L. Chapman.

As part of its programme to encourage the greatest possible use of domestic ores, the Bureau of Mines made an investigation to find ways of utilizing the wasted high-iron fraction of Arkansas bauxite, rendered unsuitable for future use by present treatment methods. The new method developed by the Bureau produces both an abrasive fraction and a high-iron fraction which can be utilized for alumina production. It consists of a 10 to 15 minute low-temperature oxidation roasting of the ore, followed by high-intensity magnetic separation of a high-iron fraction.

The report states that the new process offers recoveries of alumina not possible in present industrial practice and should be of great value in permitting exploitation of high-iron ore bauxite deposits not now considered of economic value.

### New Artificial Respiration Method Adopted by U.S. Bureau of Mines

A new back-pressure, arm-lift method of manual artificial respiration has been adopted by the U.S. Bureau of Mines and will soon be included in first-aid courses given by the Bureau's instructors to miners and others in the mineral industries.

This improved method was developed by a Dane, Hr. Holger Nielsen, and has been accepted by the Bureau and other Government and industrial organizations simultaneously as superior to other methods after extensive tests carried out by outstanding medical men of Harvard University, the University of Pennsylvania, the University of Illinois, and Springfield (Mass.) College. Among other things, the tests revealed that in the Holger Nielsen method about a quart of air is exchanged in the victim's lungs, while in the former standard Schaefer method, the amount of air exchanged is about a pint.

Mr. John J. Forbes, Director of the Bureau, said that the adoption of the new artificial respiration method does not mean that the Schaefer or Silvester methods will be abandoned. "On the contrary," he said, "there are many instances where they will be the only methods possible to use in a mine, such as in cases where the victim's arm may be injured, or when injuries prevent the victim from being placed face down." The new method will augment the other methods now being taught, he added.

The Nielsen method may be described as follows: Place the victim in a face down, prone position, bending his elbows and placing the hands one upon the other on which to rest his head sideways. After removing any foreign objects and false teeth from the mouth, and seeing that the tongue is forward, the operator kneels on either one or both knees at the head of the victim, placing the hands flat on the victim's back just below a line running between the arm pits with the tips of the thumbs just touching and the fingers spread down and outward.

The first movement consists of exerting a slow, even pressure on the back of the victim, thus forcing the air out of the lungs. After releasing the pressure, the victim's arms are drawn upward with enough "lift" applied to feel some resistance and tension at the victim's shoulders. This forces air back into the lungs and completes the cycle. The back-pressure arm-lift movements require about five seconds so that 12 complete cycles per minute can be maintained.

### New U.S. Metal Cutting Aid

The Gulf Oil Corporation has announced the development of a new lubricating device which, it claims, may nearly double the U.S. metal cutting capacity. Called Hi-Jet, the new device gets oil between metal cutting tools and their work. It is stated that it not only permits higher cutting speeds, but that it also lengthens the life of cutting tools in a great variety of metal cutting operations. Hi-Jet will be manufactured under licence by Thompson Products Inc.

## METALS, MINERALS AND ALLOYS

Throughout 1951, The Economist Index of Mineral Prices (1927=100) rose by fits and starts. On Jan. 29, 1952, it reached its peak of 374.5, as compared with 331.6 on Feb. 6, 1951; by Feb. 12, 1952, it had receded to 372.8. Whether this is another of the fluctuations which were to be seen during 1951 is an open question; but the general feeling is that the price of lead is due for a further tumble and that would mean, all other things being equal, an additional set-back. And the present weakness in the tin price is also likely to drag the index number down. The index reflects the British price of the nine minerals concerned, many of which are under the control of the Ministry of Materials.

France has suspended all metal imports with effect from February 19. After this date special licences must be obtained for all imports. Deliveries in transit prior to this date are being let in without licence.

**COPPER.**—In its weekly letter, Bache & Co. has been using an argument which has long been used by tin producers, namely, the small amount of difference that apparently large swings in the price of certain raw materials makes to the finished product. In this case, the commodity is copper. The motor industry in the U.S. requires about 5,000 tons of copper. If this were bought abroad, it might cost 40c. per lb., against the domestic ceiling price of 24½c. or 27½c. The extra cost to the industry would be roughly \$1,500,000. This sum, divided over the whole motor industry, gives an extra cost of \$1.50 per car. The letter complains that if the motor industry were to buy 5,000 tons of foreign copper at 40c., the allocation to the industry would be reduced by a similar amount. The industry would thus be paying out another \$1,500,000 to no purpose.

The copper-lead-zinc committee of I.M.C. is studying how to increase the period for which allocations can be made. At present the period is one quarter, but it is thought that longer allocation intervals would help with both Government and industry.

The D.P.A. have issued a warning that the foreign price situation may prevent the U.S. from importing its full I.M.C. quota in the current quarter and American trade circles believe that further withdrawals from the stockpile may need to be authorized during March.

The Copper Institute reports U.S. production of refined copper for January at 100,269 s.tons, compared with 98,532 s.tons the previous month and 110,114 s.tons a year ago. Stocks of refined copper at the end of January stood at 60,836 s.tons which is the lowest figure recorded since April last year and compares with the end December figure of 54,883 s.tons.

Production of refined outside the U.S.A. declined sharply in January and totalled 98,915 s.tons compared with 109,181 in December. End January stocks are estimated by the Institute to have been 150,518 compared with 152,203 s.tons a month previously.

According to A.B.M.S. figures U.S. copper imports dropped by 30 per cent last year totalling 487,600 s.tons for all forms of copper including scrap compared with 689,369 s.tons in 1950.

Chile is reported to have sold Germany some 4,000 tonnes at around 40c. per tonne. Sales totalling a similar quantity in all are believed to have been made to Sweden, Holland, Belgium and Switzerland. Under the arrangement whereby Chile is free to sell 20 per cent of her output on the free market, she should have about 60,000 tonnes for disposal on the open market during the current year.

Union Minière copper output for 1951 is reported to have achieved an all-time record of 191,000 tonnes.

**LEAD.**—Since the lead market has been easier lately, the news that the Ministry of Materials had agreed to sell 30,000 tons of lead to the U.S., has not had any great repercussions in this country. The agreement of the governments of Canada and Australia has been necessary as another 20,000 tons are understood to be coming direct from Australia and 10,000 tons from Canada. This will result in a large saving of freight charges for the Canadian lead and certain saving of handling charges for the Australian shipments as against making shipments out of British Government stocks.

Imports of lead from Australia to U.K. during 1951 totalled 107,486 tons, so that four months' supply would equal, roughly, 36,000 tons. On this showing, Australia will be able to meet her quota of 20,000 tons quite easily. Canada, on the other hand, is in a different position. During 1951, imports from that Dominion equalled 28,450 tons, so that the Canadian quota of 10,000 tons in four months would leave nothing to spare.

Readers will recall that some 30,000 tons of lead were released from the U.S. stockpile in order to keep the defence programme operating, and this purchase may well be to make good this deficiency. The deal is unlikely to cut down the supply of lead to users in this country. The Government stockpile has been growing apace recently; at the end of December it was 53,000 tons and it is now believed to be around 70,000 tons. If future deliveries, originally intended for this country, are diverted to the U.S., the stockpile, plus supplies from other lands, should be ample to keep industry going.

The deal has caused a great outcry in the U.S. Mr. Andrew Fletcher, president of the St. Joseph Lead Company, has contested the deal on the grounds that it is an encroachment of government on the traditional functions of private industry. He alleges that as a result of bulk buying the U.K. has over-bought lead, and he comes back to the contention, long maintained by his company, that the shortage in the U.S. was due to unrealistic government controls. Mr. Fletcher's opinion seems to be shared by other industrialists in the U.S.

The average price of Mexican lead f.o.b. Monterey has at last picked up a little after some weeks of continuous declines. The latest average is 18.75c. per lb. against 18.68c. per lb. a week earlier. According to the Mexican Dept. of Statistics, exports from that country at 145,000 metric tons were little more than one-half of those of 1950, when 261,000 metric tons were exported.

Consumption of lead in the U.S. during November last was, according to the Bureau of Mines, virtually unchanged from the previous month. The actual amount for November is given as 87,532 tons.

Labour troubles and the depletion of known deposits are given as the reason for the drop in the output of lead mines in the U.S. The Bureau of Mines states that production in 1951 was 390,428 tons, against 430,827 tons, a decline of roughly 9 per cent.

N.P.A. is reported to be considering granting supplementary allocations of lead to consumers whose stocks are low. There are even suggestions that the allocation scheme could be suspended altogether.

Belgian lead production in 1951 is reported at 65,000 tonnes compared with 70,000 tonnes in 1950.

**TIN.**—No further news concerning the progress of the U.S.-Indonesian talks has been received, but the President of Belgian Congo and Ruanda Urundi Tin Producers has sailed for New York to discuss the sale of tin.

Mr. Stuart Symington has left R.F.C., having handed over to the secretary. The appointment of Mr. Harry McDonald as Mr. Symington's permanent successor has encountered delays in the Senate.

Imports of tin ore into Malaya during January totalled 567 tons, made up of 473 tons from Thailand, and 94 tons from Burma.

The R.F.C. is reported to have acquired about 3,000 tons from American brokers in recent weeks. Some of this is known to be Straits tins but the quantity involved has not been revealed.

**ZINC.**—Smelter production of slab zinc in the U.S. during January reached 83,205 tons, or 2,684 tons per day. This is the fourth highest monthly production figure in the history of the industry. The record was set up in March, 1944, when 86,037 tons were produced. Shipments to domestic consumers, according to the American Zinc Institute, reached 75,039 tons in January, as compared with 73,694 tons in December. Smelter stocks rose by 4,800 tons to 26,703 tons. Despite the opinion that Prime Western is tightest, these stocks increased by 4,000 tons over the month; special high grade zinc jumped up

by nearly 1,000 tons. This easing is not expected to lead to any amelioration in zinc allocations. On the contrary, New York opinions consider that Prime Western will become even more difficult, and there seems to be no chance of consumers getting more zinc than their official allocations, as, so it is alleged, is happening in the United Kingdom.

The "Northern Miner" reports that Canadian interests are trying to abolish the end-uses control over zinc and lead.

Belgian zinc production last year is reported to have been around 200,000 tonnes which represents a small increase on the 1950 figure.

**ASBESTOS.**—The heavy demand for all grades of asbestos, anticipated by "Asbestos" of Philadelphia, as a consequence of the bigger prices, materialized in January. No slack season in the asbestos textile industry is expected. High pressure insulation is in heavy demand, the speeding up of some defence work making earlier completion dates necessary, but some delays are being encountered because of the shortage of steel and other raw materials. On the asbestos cement side, interest is being shown in the new colour designs, although the weather continues to affect sales adversely.

## The London Metal Market

(From Our Metal Exchange Correspondent)

The market has drifted during the last few days but with a reduced turnover as traders are now awaiting the outcome of the current American/Indonesian talks, and those which are probably going to be opened with the Belgian representative next week. It is reported from New York that the first arrival of tin against the recent U.S./U.K. deal was due to arrive last weekend, and in some quarters the quantity was put as high as 6,000 tons. This step has obviously been taken to tide the American authorities over the very awkward period they were due to face in the early Spring, and has relieved the President of the necessity of having to make up his mind whether he would allow the stockpile to be raided. Consumer demand in Europe is of a very spasmodic nature, and the recent added restrictions on imports into France are likely to cause a complete cessation of buying from that quarter until things get straightened out.

The prices in the other metals remain unchanged but with a steadier undertone. In the U.S. the import duties on lead and zinc have been suspended from February 12, 1952, until March 31, 1953, or the end of the National Emergency, but with the proviso that the duty will be reimposed should the domestic market price fall below 18c. per lb. for any one month. It is understood that fair tonnages of lead are being offered and the recent purchase from the U.K. Government of 30,000 tons of lead shows that the American market and stockpile are capable of absorbing large tonnages, but it remains to be seen whether the commercial buyers will remain in the market at the ceiling price should offers continue to come in freely. The position of zinc is not so easy and foreign quotations are still well above the American ceiling price parties.

On Thursday the official close on the tin market was: Settlement price £980, Cash Buyers £979, Sellers £980; Three months' Buyers £981, Sellers £982. In the afternoon the market was steady. Turnover for the day was 125 tons. Approximate turnover for the week was 460 tons.

The Eastern price on Thursday morning was equivalent to £991 per ton, c.i.f. Europe.

## Iron and Steel

The steel industry seems to be passing through its most difficult period since the war ended. The shrinkage in ingot production since the turn of the year has been more serious than was anticipated and this in turn has restricted rolling mill activity. Imports of steel semis from the Continent are also on a disappointing scale. British Iron & Steel Corporation contracts with France and Belgium for the supply of semi finished steel are heavily in arrears and in consequence the sheet and light section mills are working irregularly, at a time when there is an overwhelming demand for these products.

The new system of controlled distribution, moreover, is not immune from teething troubles. Justifiably or otherwise, consumers complain of the severity of the cuts in their allocations, and insist that industrial stoppages will be unavoidable unless

their allotted tonnages for the second quarter of the year are on a more generous scale.

Finally, the prolonged delay in announcing the new fixed prices of iron and steel in the home market is very disturbing. It is recognized that there will have to be a steep advance and buyers will be glad when the prevailing uncertainty is dispelled and they know the worst.

There is no hint of any improvement in the supply of scrap either from foreign or home sources. On the other hand pig iron production is on a slightly better scale and blast furnace men hope that this rising trend will be accelerated. There is, however, scope for much more rapid expansion before the aggregate supply of pig iron overtakes the requirements of the steel works and foundries. Indeed, foreign iron is still being imported and exports banned.

The potentialities of the steel export trade are enormous. British prices compare favourably with those of Continental competitors and the overseas demand is simply overwhelming. The volume of foreign trade in steel will in fact be determined by the licensing authorities, who fix the export quotas. Requisitions from South Africa, Australia and New Zealand are exceptionally heavy, notwithstanding the heavy burden of high freight-rates.

The fuel position at the iron and steel works is a little easier and with plenty of tonnage available at the ore ports, imports of foreign ore have recently been on such a scale as to cover current consumption and leave a margin for the replenishment of stocks.

### FEBRUARY 21 PRICES

COPPER				
Electrolytic	...	...	£227	o o d/d
TIN				
(See our London Metal Exchange report for Thursday's prices)				
LEAD				
Soft foreign, duty paid	...	...	£170	o o d/d
Soft empire, including secondary lead	...	...	£170	o o d/d
English lead	...	...	£171 10	o o d/d
ZINC				
G.O.B. spelter, foreign, duty paid	...	...	£190	o o d/d
G.O.B. spelter, domestic	...	...	£190	o o d/d
Electrolytic and refined zinc	...	...	£194	o o d/d
ANTIMONY				
English (99%) delivered,	...	...	£365	per ton
to cwt. and over	...	...	£290	per ton
Crude (70%)	...	...	42s. 6d./47s. 6d. nom. per	unit, c.i.f.
Ore (60% basis)	...	...	42s. 6d./47s. 6d. nom. per	unit, c.i.f.
NICKEL				
99.5% (home trade)	...	...	£454	per ton
OTHER METALS				
Aluminium, £148 per ton.	...	...	Palladium, £8 10s. oz.	
Bismuth, 28s. lb.	...	...	Platinum (scrap), £33.	
Cadmium, 18s. 9d. lb.	...	...	Platinum, £27 33s. nom.	
Chromium, 6s. 3d. lb.	...	...	Rhodium, £45 oz.	
Cobalt, 20s. lb.	...	...	Ruthenium, £30 oz.	
Gold, 248s. f.oz.	...	...	Quicksilver, £73 10s./£74	
Iridium, £65 oz. nom.	...	...	ex-warehouse.	
Magnesium, 2s. 10½d. lb.	...	...	Selenium, 25s. nom. per lb.	
Osmiridium, £35 oz. nom.	...	...	Silver (bar), 77d. f.oz. spot	
Osmium, £70 oz. nom.	...	...	and forward.	
	...	...	Tellurium, 19s. lb.	
ORES, ALLOYS, ETC.				
Bismuth	...	...	50% 16s. lb. c.i.f.	
	...	...	40% 14s. 9d. lb. c.i.f.	
Chrome Ore—	...	...		
Rhodesian Metallurgical (lumpy)	...	...	£13 per ton c.i.f.	
" " (concentrates)	...	...	£13 per ton c.i.f.	
" " Refractory	...	...	£12 12s. per ton c.i.f.	
Baluchistan Metallurgical	...	...	£14 16s. per ton c.i.f.	
Magnesite, ground calcined	...	...	£26 - £27 d/d	
Magnesite, Raw	...	...	£10 - £11 d/d	
Molybdenite (85% basis)	...	...	103s. 1½d. per unit c.i.f.	
Wolfram (65%), U.K.	...	...	485s. nom. c.i.f.	
Tungsten Metal Powder	...	...	35s. nom. per lb. (home)	
(for steel manufacture)	...	...		
Ferro-tungsten	...	...	33s. nom. per lb. (home)	
Carbide, 4-cwt. lots	...	...	£30 3s. 9d. d/p per ton	
Ferro-manganese, home	...	...	£41 15s. 1½d. per ton	
Brass Wire	...	...	2s. 7½d. per lb. basis.	
Brass Tubes, solid drawn	...	...	2s. 1d. per lb. basis.	

## THE MINING MARKETS

*(By Our Stock Exchange Correspondent)*

The week under review was a short one, the Stock Exchange being shut on the day of the funeral of the late King. Some definite trends, however, became apparent.

In the gilt-edged market a new Colonial issue was made. This consisted of £5,983,000 Uganda 3½ per cent Stock 1966/69 issued at 89 per cent. There is already in existence a stock of this date bearing the same rate of interest. While the object of the colonial authorities is clearly to consolidate the existing and new loans, the issue price is of considerable interest, especially in view of the comments previously made in this column. The stock offers medium term capital appreciation and contrasts with the recent issue of 4½ per cent Southern Rhodesia Government Stock at 99 per cent. The existing issue stands at around 91 per cent.

Outstanding was the heavy fall in commodity shares and the firmness of Kaffirs. While it is too early to predict any definite trend, it is interesting to speculate whether this marks a turn in commodity issues and the return of public interest to gold shares.

In spite of the strong technical position of the metal, coppers showed the heaviest declines. This was mainly a psychological movement initiated by the recent heavy fall in the price of rubber. Wall Street has been full of gloomy prophets and London has seen sellers, but no buyers. The interesting point is that coppers have fallen despite the existing high premium on the free market vis-a-vis U.K. and U.S. fixed prices. French buying of Tanks was reported to have dried up and the shares fell 4s. 6d. The Messina report although it makes satisfactory reading, showing net profits as high as £1,051,000 against £663,000 for the preceding eight months, only contrived to lessen the decline in the value of the shares. Operating costs have risen to 29s. id. per ton of ore against 26s. 11d.

Lead/Zinc shares also fell, although less severely than coppers. This was particularly applicable to Barriers. Consolidated Murchison, the South African antimony producer declined sharply. The figures for the December quarter show

a net profit of £524,896 against £589,174 for the September quarter. The market reports switching from this stock into gold shares. Consolidated Murchison at their present level are very vulnerable to changes in the price of antimony.

Premium prices for lead and zinc on the Continent have recently been falling, although they are still above the fixed U.S. and U.K. prices. Last year many producers sold their output in Europe at high prices rather than to their usual markets in the U.S. Consequently, U.S. suffered a rather artificial shortage of lead and now that prices are nearer the line they may re-enter the market.

Tin shares, especially Eastern issues, also eased. A leading daily newspaper has been publishing pessimistic articles on the situation in Malaya and these, coupled with the general tendency of commodity prices, caused a fall. Even companies in a strong position, like British Tin Investment, and Pataling, have suffered. Here again the technical position of the metal does not appear quite so black as some people paint it, at any rate for the immediate future.

Kaffirs formed the brightest feature. Gold shares have now been a falling market for a long time and there has been some switching from base metal issues. The January Rand returns showed more favourable conditions than for some time past. Twenty-three Rand producers actually recorded decreased costs while only seventeen showed increased costs. Provided this trend can be maintained it confirms the continued flattening of the costs graph. Investors showed definite preferences for West Rand issues of the W.R.I.T.S. and West Rand Consols Group. Western Reefs were also favoured. All these mines have yet to reach their full production and offer attractions on the medium term investment outlook. Rumours are circulating concerning the prospects of certain Rand producers of uranium. While this is likely to remain a closely guarded state secret, Randfontein again were prominent in this connection.

O.F.S. issues showed firmness. Harmony alone eased on further consideration of the new capital issue.

## COMPANY NEWS AND VIEWS

### Tin Prospects: No Cause for Pessimism

"Short of a major political catastrophe," states Mr. E. V. Pearce, chairman of British Tin Investment Corporation, in his address to shareholders circulated with the report and accounts for the calendar year 1951, he could see no cause for pessimism regarding the long term outlook for tin. This favourable view of the long term tin prospects is based on the reasoning that any material increase in Malayan tin production is unlikely in view of the fact that prospecting has been at a standstill for twenty years, and that the severe restrictions on the end uses of tin now in force in the U.S.A. may be lifted in the not far distant future. That the corporation stands solidly behind this viewpoint is reflected in the fact that the predominant portion of its investments still consists of shares in tin mining companies. The corporation is, however, continuing to extend the scope of its shareholding interests to include companies mining metals other than tin and at the end of 1951 its portfolio included a wide range of mining companies producing aluminium, copper, diamonds, gold, lead, oil and zinc. (A list of the corporation's principal investments are given in the chairman's statement which appears on page 208).

Year to Dec. 31	Gross Dividend		Gross Tax		Net Profit	Divi-	Carry
	Income	Revenue	£	£	£	%	Forward
1950	430,571	434,145	194,510	228,976	19	106,488	
1951	594,074	597,119	280,750	304,778	27	112,870	

The profit and loss account calls for little comment. The prosperity enjoyed by many tin producers during 1951 is mirrored in the advance in the gross dividend income received which raised total revenue to £597,000 compared with £434,000 previously. The lion's share was, of course, taken by the ex-chequer but shareholders also participated in the improvement receiving 27 per cent (19 per cent) which absorbed £298,396 against £225,771.

The market value of the corporation's investments as at December 31 last was £3,817,488 (£3,146,766) which compared with the book value at the same date of £2,902,578.

The annual meeting will be held in London on March 13.

### Consolidated Murchison Profits Lower in December Quarter

The estimated profit from antimony and gold of Consolidated Murchison (Transvaal) Goldfields and Development in the December quarter of 1951, amounted to £709,896 compared with £803,174 in the previous quarter.

The estimated taxation outtake was £185,000 leaving a net profit, after crediting a revenue of £788 received during the quarter from premium gold sales, of £525,684.

	March	June	Sept.	Dec.	Total
	Qtr.	Qtr.	Qtr.	Qtr.	(1951)
Profit.....	(1951)	(1951)	(1951)	(1951)	(1951)
£	£	£	£	£	£
Profit.....	538,315	698,425	803,174	709,896	2,749,810
Est. Tax..	139,000	192,000	214,000	185,000	730,000
Net Profit	399,315	506,425	589,174	524,896	2,019,810

At the end of 1951 ore reserves of gold and antimony deemed to be payable at present prices totalled 352,000 tons, an improvement of 168,000 tons compared with the preceding year. In addition, 40,000 tons (same) averaging 6.8 dwt. per ton, were deemed to be payable on account of gold content only.

Development footage advanced during the quarter amounted to 3,087 ft., of which 1,262 ft. were in the ore body. Of the 1,160 ft. sampled in the ore body a payable footage on account of the combined antimony and gold content of 1,085 ft. resulted. Capital expenditure during the period amounted to £61,085.

### Anglo-Burma Tin Earns More

Despite the difficult conditions with which the Anglo-Burma Tin Co. in Burma is faced, its Heinda plant operated continuously for the first nine months of the company's financial year, which ended May 31, 1951, producing 205 tons tin ore

against 289 tons previously. Additionally, tribute operations at Shanthe and Thabawleik produced 8½ tons tin ore compared with 13½ tons, thus giving a total output from all sources of 213.25 tons against 302.13 tons in the preceding year.

The profit and loss account reflected the higher world prices for tin and revenue from sales and stock of tin ore amounted to £167,761 (£134,579) to which was added income from interest and sundry receipts giving a gross revenue figure of £167,978 compared with £135,125 previously. Expenditure in Burma and London was heavier, £105,818 against £80,694, and after providing for this outlay, for taxation liabilities of £27,334 (£20,150) and for interest on its 4 per cent and 6 per cent debenture stock, net profit for the year was £14,535 against £10,759.

The company's taxation liability in respect of all the years up to and including the year to May 31, 1950, have now been agreed, with the result that the total provisions in previous years having proved to be in excess of requirements, a sum of £15,000, has been transferred from the taxation reserve to the credit of the appropriation account. This enabled the company to make an allocation of £25,000 to general reserves leaving £4,972 (£437) to be carried forward.

At the annual meeting to be held in London on March 12, the chairman, Mr. John Miller, will review the latest developments in the Burmese situation as it affects the company.

### Company Shorts

**Ariston Gold Distributes Less.**—Ariston Gold Mines (1929) is recommending the payment of a final dividend of 17½ per cent making a total of 25 per cent for the year ended Sept. 30, 1951, as against a final of 15 per cent making 30 per cent in the previous year.

The preliminary results for the year ended September 30, 1951, show that net profit, after providing £177,387 (£246,163) for taxation, amounted to £155,037 compared with £249,542 in 1950. Credit tax adjustments in respect of the previous year's dividend was £4,219 against a taxation over-provision of £41,837.

The sum of £30,000 (nil) was allocated to tax equalization reserve, and the forward balance at the fiscal year-end was recorded at £62,982 against £75,793 in the preceding year.

The annual meeting will be held in London on March 18. Major-General W. W. Richards is chairman.

**Paringa Seeks Base Metal Properties.**—Paringa Mining and Exploration, which suspended milling operations on Jan. 16, 1951, recorded a net loss for the year ended August 31, 1951, of £26,769. But after writing off £194,184 for mine development, £10,588 for exploration expenditure, £28,924 off the book value of investments, and adding £9,031, being the debit balance brought in, the adverse balance at August 31, 1951, stood at £269,496.

In the review to be presented at the annual meeting to be held in London on March 12, it is stated that the difficult conditions existing in the gold mining industry in Australia still prevail, and to date there is no indication of any improvement in the foreseeable future. In view of the existing high prices for base metals, the directors are considering extending the company's activities to this field, if suitable areas can be found. To date, however, no such property has been located.

**Burma Corporation Scheme: the Final Stage.**—The Burma Corporation will hold an extra-ordinary general meeting on March 26 next in Rangoon to consider resolutions, previously announced in *The Mining Journal*, placing the Corporation in voluntary liquidation and authorizing it to distribute to shareholders shares held in Burma Mines and in Non-Ferrous Metal Products.

This meeting will represent the final stage in the Corporation's re-organization scheme. At the end of 1951 a new local company, Burma Corporation (1951) was incorporated.

If the resolutions winding up the corporation are approved at the meeting, assets available for distribution will comprise 13,541,689 ordinary shares of 3s. 6d. each in Burma Mines and a similar number in Non-Ferrous Metal Products. These shares will be distributed to Burma Corporation shareholders on the basis of one fully paid ordinary share of 3s. 6d. in Burma Mines and one fully paid ordinary share of 1s. in Non-Ferrous Metal Products for every share held in Burma Corporation.

**Mount Elliott Reduces its Debit Balance.**—Mount Elliott's chief asset, apart from cash amounting to £31,157, at Sept. 30, 1951, and its Queensland mining property consisted of its holding of shares in Esperanza Copper and Sulphur Company. At the date of the latest balance sheet—September 30, 1951—the market value of the Company's holding was £59,461, compared with a book value of £23,105. This reveals a sharp appreciation over the previous year's figures when the market value was only £4,419 and the book value £15,295.

The profit and loss account records a net profit of £23,472, which was applied to reducing the debit balance of £27,497 brought forward, leaving the adverse balance on general expenditure account at £4,025.

The improvement in the results under review was wholly due to the receipt of £24,962 (nil) profit from sale of investments.

The annual meeting will be held in London on March 10. Mr. O. V. G. Hoare is chairman.

**Mount Charlotte (Kalgoorlie) Gold Mines.**—In view of the adverse conditions prevailing in the gold mining industry in Western Australia, the directors of Mount Charlotte (Kalgoorlie) Gold Mines in their report for the year ended August 31, 1951, state that it is not intended to resume operations at the mine until conditions improve. This has led the board to dispose of certain plant and equipment which it purchased from the Wiluna Co. at a total cost of £32,340. The sum of £22,000 was borrowed from the Paringa Mining & Exploration Co. to assist in effecting this purchase, and as the major portion of this plant has now been sold at slightly above cost price, the whole of the loan from the Paringa Co. has been repaid. The whole of the expenditure on the Mount Charlotte Mines since their acquisition, and on other interests in Australia, have been written off, leaving a balance sheet figure of £50,000, which was the original cost to the company of the leases comprising the Mount Charlotte Mines. The expenditure on abandoned properties in Rhodesia totalling £50,039 has also been written off. Furthermore, steps have been taken to reduce administration costs to a minimum and it is hoped that income will be received to match expenditure.

The profit and loss account shows that the amount written off Mount Charlotte mines was £47,621, and this figure, taken in conjunction with the sum of £50,039 written off abandoned properties in Rhodesia, brought the total written off during the year to £97,660. Against this there was a net profit for the year of £113, thus leaving an adverse balance at the fiscal year-end of £97,547.

The annual meeting will be held in London on March 13. Mr. Charles S. Beale is chairman.

**West Rand Consolidated: Ore Reserves.**—Total estimated ore reserves of West Rand Consolidated at December 31, 1951, amounted to 9,729,000 tons compared with 10,047,000 tons at the end of 1950—a decline of 318,000 tons. In last week's issue on page 178 the decline in the ore reserve position was given as 985,000 tons. This figure excluded 667,000 tons (in shaft pillars) from the total ore reserve figure for 1951 but no similar exclusion was taken into account for the 1950 total which contained 687,000 tons in shaft pillars. Thus excluding from the ore reserves tonnages in shaft pillars in both years, the decline would be only 298,000 tons.

**Wankie Colliery.**—At the extraordinary meeting of the Wankie Colliery held in London last Tuesday, the resolutions in connection with the transfer of the management and control of the company to Southern Rhodesia and the appointment of Mr. Robert Foot as executive chairman, residing in Southern Rhodesia, were carried unanimously.

**Anglo-French—A Correction.**—In last week's issue in these columns under the heading "Anglo-French maintains steady progress," it was stated that the current dividend payment was being distributed on capital increased by £250,000 to £1,000,000 in October last. Actually, only £50,000 in £1 shares of the £250,000 authorized increase were issued so that the dividend was paid on £800,000 issued capital and not £1,000,000 as stated.

**Mr. John Worroker Austin** of Sidney, Australia, has been appointed to the boards of Placer Development and Bulolo Gold Dredging in place of Mr. William Addison Freeman who has resigned.

**Mr. Carl R. Davis** has resigned from the board of Anglo-American Corporation of South Africa.

**Mr. R. Franklin** has joined the board of Oceana Development.

**Sir Norman Mighell** has been appointed a director of New Broken Hill Consolidated and of the Zinc Corporation.

**Messrs. John Taylor & Sons** have announced that they have taken Mr. John Tillard Meadows Taylor into partnership as from the beginning of the year.

**Mr. G. V. White** has joined the board of Witbank Colliery.

## ALPINE (BARBERTON) GOLD MINE LTD.

The Fifteenth Annual General Meeting of Alpine (Barberton) Gold Mine Limited was held on February 20 in London, Mr. A. H. M. Wedderburn (the Chairman) presiding.

The following is the Chairman's statement circulated with the report and accounts:—

The year under review has been one of disappointment, in which the Mine yielded adequate monthly surpluses only during the first quarter. Thereafter, while costs tended to rise, it was not found possible to maintain the grade of ore milled, owing to the limitation on the percentage that could be hoisted from the richer stope at the deeper levels.

As a result, the recovery fell 200 f.oz. short of that in the previous year, and the average grade recovered fell from 5.31 to 4.59 dwt. per ton.

The gold revenue, however, owing to the benefit of the increased price in a full year, rose by £5,415 to £96,250. As against this, working expenses exclusive of development rose by £17,700, and the working surplus fell to £11,228. After taking into account the items of development, administrative expenses and depreciation, the profit for the year amounts to £111.

Two rather brighter features are the increase in the estimated ore reserves from 47,482 to 51,430 tons and the somewhat improved position of the Company at the end of the year in respect of its liquid resources.

The General Managers' Chief Engineer visited the Mine in the early part of 1951, and after full consultation on the part of all concerned a revised development programme has been submitted to and approved by the Board and is now being carried out.

Much will depend on the results of this programme over the coming months. In the meantime the operating results for the current year are, and are likely to remain, meagre and not more than sufficient to enable the Mine to hold its own during the critical period.

Mr. H. L. Krause has resigned his membership of the South African Local Board, which now consists of Mr. D. C. Irish (Chairman), Mr. L. W. E. Barnes and Lt.-Col. H. K. Roseveare. Your Board wishes to express its gratitude to all these gentlemen for their valuable help, as well as to the Consulting Engineers, the Mine Manager and all Members of the Staff.

The report was adopted.

## Tin Companies Quarterlies

We give below the output figures for the December quarter for a number of tin companies some of which do not publish monthly figures, and are therefore not included in our monthly mine return figures:

**Ayer Hitam Tin Dredging.**—568 tons ore.

**Bangkin Tin Dredging Co.**—287 tons ore.

**Chenderiang Tin Dredging.**—40½ tons ore.

**Gopeng Consolidated.**—238 tons ore.

**Hongkong Tin.**—47½ tons ore.

**Idris Hydraulic Tin.**—80½ tons ore.

**Ipoh Tin Dredging.**—

Lahat Section—Tributors: 56 tons ore;

Puchong Section—Dredge: 64½ tons ore;

Tributor: 28 tons ore.

**Kent (F.M.S.) Tin Dredging.**—150 tons ore.

**Kepong Dredging.**—70 tons ore.

**Killinghall Tin.**—125 tons ore.

**Kinta Tin Mines.**—100½ tons ore.

**Lahat Mines.**—27 tons ore.

**Malayan Tin Dredging.**—195½ tons ore.

**Pari Tin.**—9½ tons ore.

**Pengkalan.**—134 tons ore.

**Petaling Tin.**—524 tons ore (No. 5 dredge shut down 2 weeks).

**Puket Tin Dredging.**—11½ tons ore.

**Pusing Rubber & Tin.**—Gross mining tribute, £3,185.

**Rambutan.**—22 tons ore.

**Selayang Tin Dredging.**—107 tons conc.

**Siamese Tin Syndicate.**—42½ tons ore.

**Southern Malayan Tin Dredging.**—81½ tons ore.

**Southern Tronoh Tin Dredging.**—128½ tons ore (two dredges).

**Sungei Kinta Tin Dredging.**—90½ tons ore;

Tributors: 9½ tons ore.

**Sungei Way Dredging.**—73½ tons ore.

**Tanjong Tin Dredging.**—304 tons ore.

**Tekka.**—18 tons ore.

**Tekka-Taiping.**—91 tons ore.

**Temoh Tin Dredging.**—(Tributors) 62½ tons ore.

**Tronoh Mines.**—346½ tons ore.

**Sungei Besi Mines.**—

**Sungei Besi Section.**—113½ tons ore;

**Pelepas Section.**—Dredge 157½ tons ore;

Tributors: 3½ tons ore.

## BRITISH TIN INVESTMENT CORPORATION

### INCREASED PROFIT

#### TIN PRICES: EFFECT OF AMERICAN ATTITUDE

##### MR. ERNEST V. PEARCE ON THE OUTLOOK

The Annual General Meeting of the British Tin Investment Corporation, Ltd., will be held on March 13 at Winchester House, Old Broad Street, London, E.C.

The following is the statement by the chairman, **Mr. Ernest V. Pearce, A.Inst.M.M.**, circulated with the report and accounts:—

The profit for the year ended December 31, 1951, amounted to £577,767, an increase of £156,687 on that of the previous year. After making full provision for taxation there remains a balance of £300,194 which, with the balance brought forward from the 1950 accounts, makes available £388,530.

Deducting the interim dividend of 9 per cent, less tax, which absorbed £99,465, and was paid on August 18, 1951, there remains a balance of £289,065. Your directors recommend the payment of a final dividend of 18 per cent, less tax, and that the balance of £90,134 be carried forward. If these recommendations are approved by members at the forthcoming annual general meeting, warrants will be posted on March 13.

#### UNQUOTED SECURITIES

There is, I think, only one item in the accounts on which I need comment—namely, the value, shown in the balance sheet, of "Securities not quoted." We have applied a portion of the profits we have realised on the sale of some of our investments in writing down this item. Members are aware that in the past we have been unable to place a value on an investment we have in a company having interests in Siam. We are still in that position, but thought it wise precaution to take this action. We believe that this investment has considerable potential value but we realise that, notwithstanding the large amount of work which has already been done, much has yet to be accomplished before the particularly difficult metallurgical problem with which that company is faced is solved.

While the bulk of the Corporation's investments consist of shares in tin mining companies, we have further implemented the policy of broadening our portfolio.

#### PRINCIPAL HOLDINGS

In order that members may have a clear picture of our investments we have segregated them and give below lists showing our principal investments in tin mining and miscellaneous mining companies.

#### TIN MINING COMPANIES

Amalgamated Tin Mines of Nigeria, Ltd.  
Ayer Hitam Tin Dredging, Ltd.  
Kamunting Tin Dredging, Ltd.  
Larut Tin Fields, Ltd.  
London Tin Corporation, Ltd.  
Malayan Tin Dredging, Ltd.  
Pengkalan, Ltd.  
Petaling Tin, Ltd.  
Rahman Hydraulic Tin, Ltd.  
Rawang Tin Fields, Ltd.  
Southern Kinta Consolidated, Ltd.  
Southern Malayan Tin Dredging, Ltd.  
Southern Tronoh Tin Dredging, Ltd.  
Sungei Besi Mines, Ltd.  
Sungei Way Dredging, Ltd.  
Tekka Taiping, Ltd.  
Tronoh Mines, Ltd.

#### MISCELLANEOUS MINING COMPANIES

Aluminium, Ltd.  
Anglo-Newfoundland Development Company, Ltd.  
Associated Manganese Mines of South Africa, Ltd.  
British South Africa Company.  
Consolidated African Selection Trust, Ltd.  
Consolidated Mining and Smelting Company of Canada, Ltd.  
Consolidated Zinc Corporation, Ltd.  
De Beers Consolidated Mines, Ltd.  
Hollinger Consolidated Gold Mines, Ltd.  
Hudson Bay Mining and Smelting Company, Ltd.  
Imperial Oil, Ltd.  
International Nickel Company of Canada, Ltd.  
Lake George Mining Corporation, Ltd.  
Messina (Transvaal) Development Company, Ltd.  
Mining Corporation of Canada, Ltd.  
Mount Morgan, Ltd.

Nchanga Consolidated Copper Mines, Ltd.

Noranda Mines, Ltd.

Rhodesia Broken Hill Development Company, Ltd.

Rhodesian Selection Trust, Ltd.

San Francisco Mines of Mexico, Ltd.

#### TIN THE PREDOMINANT INTEREST

From these lists members will note that the Board has varied its previous practice and set out the Corporation's investments in greater detail. It should not, however, be assumed that all the shares now listed for the first time have been purchased during the financial year just ended. Here I would like, again, to mention that the predominant portion of the Corporation's investments consists of shares in tin-mining companies.

During the year the War Damage Commission in Malaya has completed many of the assessments for claims for damage arising from the Japanese occupation and interim payments of 60 per cent of the assessed awards have been paid. These awards have been or will be set off against advances which the companies have received for rehabilitation purposes.

#### PRICE MOVEMENTS

The average price of tin on the Singapore market during 1951 was £1,039, as compared with an average of £726 during 1950 and £597 during June, 1950, the month of the outbreak of the Korean war. Early in 1951 increased demand for tin by many countries, superimposed on American buying for their stockpile, was responsible for a rapid rise until, on February 14, 1951, the Singapore price was declared at £1,552—the highest price ever reached.

On March 6 of last year the Government of the U.S.A. announced that no further purchases would be made for the stockpile; on March 12 all imports of tin into the U.S.A. by private dealers were prohibited and the Reconstruction Finance Corporation was appointed the sole importer. From this time the R.F.C. pursued an openly avowed policy of depressing the price by lowering the U.S.A. price in successive stages from £1,204—the price on March 30—to £824 on August 1. As a result the Singapore price reached the lowest price of the year—£793—on August 7.

As showing the length to which the Reconstruction Finance Corporation were prepared to go in pursuance of their policy, they established a complete boycott of the Singapore market for some nine months of the year. The effect of this can be seen from the figures given below, which represent shipment of Straits tin to the U.S.A. during the years 1950 and 1951.

1950 .....	44,590 l.tons
1951 .....	2,532 "

However, largely, I think, due to the widespread belief that sooner or later the U.S.A. would be compelled to resume purchases, the Singapore price rose substantially above the U.S.A. price of £824 during the remainder of the year.

#### ARRANGEMENT WITH U.S.A.

As a result of the recent visit of the Prime Minister to America it has been announced that in return for 1,000,000 tons of steel an arrangement has been concluded, under which the United Kingdom has agreed to sell during 1952 20,000 tons of tin at the fixed price of £944 per ton f.o.b. Malayan or U.K. ports. The bulk of the 20,000 tons sold under the agreement will presumably be purchased in the Singapore market, and, judging from the present trend, at prices in excess of £944.

The agreement contains a provision that if during the period when the deliveries are to be made the U.S.A. Government agrees to pay any other supplier a price higher than U.S. \$1.18 per lb. (£944 per ton) f.o.b. port of shipment, an equivalent price will be paid to H.M. Government for any quantity which has not been declared as being available for shipment. It seems that H.M. Government will have to bear the difference, if any, between £944 per ton and the price at which they can obtain in the free markets such quantities as they must purchase in order to fulfil their obligations. Steel is so urgently required in this country that no one, I think, has cause for complaint at the terms of the agreement reached.

Production of tin in Malaya amounted during 1951 to 57,166 tons, compared with 57,537 tons in 1950. That production has been maintained at this level is proof, if any were required, of the loyalty, courage and devotion to duty shown by the men responsible for carrying out the day-to-day operations.

#### TIN: NO CAUSE FOR PESSIMISM

I regret to say that there seems to be no improvement in security conditions in Malaya since I addressed you last year. We have, however, the unequivocal declaration by H.M. Government that the British are not to be ousted from the country. Changes to be introduced in the administration as a result of the recent visit of the Secretary of State for the Colonies, Mr. Oliver Lyttelton, will it is believed ultimately result in restoring order, but, as he pointed out, this will take time to achieve.

Short of a major political catastrophe I see no cause of pessimism regarding the long-term outlook for tin for the following reasons:-

(1) The fact that for the last 20 years prospecting in Malaya has been practically at a standstill and as a consequence it is unlikely that there will be any material increase in production there for some years.

(2) That the time will come, and it may not be far distant, when the severe restrictions imposed on the end uses of tin in the U.S.A. must be lifted.

#### WORK OF RESEARCH INSTITUTE

In conclusion, I wish to refer to the excellent work carried out during the last few years by the International Tin Research Institute in the laboratories at Greenford, Perivale, the funds for which are provided by producers in all the tin-producing countries.

After much patient and costly work the Institute has devised, among other things, two alloys which bid fair to absorb considerable tonnages of tin—they are a tin-nickel alloy and a tin-zinc alloy, both of which are to-day commercially established. These alloys represent an entirely new outlet for tin, and it is hoped that ultimately they will together absorb some 10,000 to 12,000 tons annually.

Research is essential if progress is to be achieved. It is expensive and results at times seem slow of attainment, but once attained they can be of inestimable value to industry. In order to widen the scope of its activities, the Tin Research Institute is appealing to all tin-producing countries to increase their annual contributions—some have already agreed—and it is hoped that at an early date agreement will be forthcoming from the remainder. I make no excuse for mentioning research in this statement, for I believe that it is of vital importance to the industry in which your Corporation is so greatly interested.

## December Mine Returns

#### MISCELLANEOUS

**Alpine (Barberton)**.—2,850 tons yielded 625 oz.; profit £141.  
**Brit. Guiana Cons.**.—122,933 cu. yd. dredged yielding 643 oz.  
**Cam & Motor**.—23,500 tons yielded £71,383; profit £33,198.  
**Cuthia**.—(Dec. 8-Jan. 4) dredge worked 431 hours yielding 666 oz.  
**Dominion Reefs**.—21,000 tons yielded 1,980 oz.; profit £222.  
**Frontino**.—9,532 tons yielded 7,000 oz.  
**Kentan (Geita)**.—17,500 tons yielded 2,617 oz.  
**Martha Gold**.—(35 days to Dec. 31) 14,040 tons yielded 5,211 oz. gold and 35,307 oz. silver.  
**Motapa**.—23,600 tons yielded 2,180 oz.; profit £564.  
**Rezende**.—6,300 tons yielded £14,453; profit £1,750.  
**Rosterman**.—1,666 tons yielded 938 oz.; profit £1,779.  
**Sherwood Starr**.—2,240 tons yielded £3,183; profit £1,858.  
**St. John D'El Rey**.—33,800 tons yielded value £228,642.  
**Thistle-Etna**.—3,200 tons yielded 335 oz.

#### Coal and Miscellaneous Base Metals

**Apex Mines**.—90,020 tons coal.  
**Broken Hill South**.—(Dec. 1-Dec. 29) 11,970 tons ore (assaying 73.7 per cent lead, 51.9 per cent zinc and 41.9 oz. silver) yielded 1,853 tons lead conc. and 2,237 tons zinc conc.  
**Dundee**.—39,695 tons coal.  
**Mount Isa**.—47,030 tons yielded 2,875 tons lead-silver bullion assaying 93.9 oz. silver per ton and 3,667 tons zinc conc.  
**Natal Navigation**.—120,157 tons coal.  
**Rhodesia Broken Hill**.—1,915 tons zinc and 1,020 tons lead and 22.82 tons fused vanadium.  
**T.C.L. & Exploration (Van Dyks Drift Colliery)**.—45,999 tons coal.  
**U.F.S.C. & G. (Raleigh Colliery)**.—27,035 tons coal.  
**Wankie Colliery**.—183,304 tons coal sales and 10,109 tons coke sales.  
**Witbank Colliery**.—133,417 tons coal.

#### Oil

\* Tonnage output has been converted at seven barrels to the ton.

**Anglo-Ecuadorian**.—231,028 barrels.  
**Anglo-Egyptian Oilfields**.—951,579 barrels.  
**Apex (Trinidad)**.—271,354 barrels.  
**British Controlled Oilfields**.—29,581 barrels.  
**Kern**.—188,232 barrels.  
**Kuwait**.—19,812,401 barrels.  
**Lobitos**.—252,672 barrels.  
**Trinidad Central**.—43,307 barrels.  
**Trinidad Leaseholds**.—516,505 barrels.  
**Trinidad Petroleum Development**.—257,732 barrels.  
**Utramar**.—739,563 barrels.  
**United British Oilfields of Trinidad**.—399,019 barrels.

#### W. E. SINCLAIR, M.I.M.M.

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#### CONSOLIDATED MURCHISON (TRANSVAAL) GOLDFIELDS AND DEVELOPMENT, COMPANY

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(Incorporated in the Union of South Africa)

#### Directors' Report for the Quarter Ended 31st December, 1951

The following is the report on the work done during the quarter ended 31st December, 1951:—

Tons crushed	42,341
Estimated profit from Antimony and Gold	£700,896
Estimated Taxation	£185,000

In addition, revenue of £788 was received during the quarter in respect of increased revenue from the sales of gold at higher than standard prices.

The capital expenditure during the period amounted to £61,085.

During the quarter the Development footage accomplished amounted to 3,087 feet, of which 1,282 feet were in the ore body. The sampling of 1,160 feet in the ore body gave the following results:—

Payable on account of the combined gold and antimony content 1,065 feet.

Unpayable, 75 feet.

At the 31st December, 1951, the ore reserves which were deemed to be payable at current prices on account of gold and antimony content combined amounted to 352,000 tons. In addition a tonnage of 40,000 tons with an average value of 6.8 dwts. per ton was deemed to be payable on account of gold content only.

In determining the payable footage the prices of Gold and Antimony as at the 31st December, 1951, have been used.

The development figures mentioned above are the actual result of the sampling of development work in the ore body; no allowance has been made for modification which may be necessary when computing the ore reserves.

By Order of the Board,  
**ANGLO-TRANSVAAL CONSOLIDATED INVESTMENT COMPANY, LIMITED.**

Secretaries,  
JOHANNESBURG

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